No. 184. Vol. XXXIX. Part 2. APRIL, 1954.

GEOGRAPHY

FORMERLY THE GEOGRAPHICAL TEACHER.

THE QUARTERLY JOURNAL OF THE

GEOGRAPHICAL ASSOCIATION

Central Office :
c/o The Park Branch Library,
Duke Street, Sheffield, 2.
(Telephone : 25946.)

LONDON :
PUBLISHED FOR THE GEOGRAPHICAL ASSOCIATION BY THE LONDON GEOGRAPHICAL INSTITUTE
MESSRS. G. PHILIP AND SON, LTD., 32, FLEET STREET, E.C.4. AND PRINTED BY
PERCY BROTHERS, LTD., THE HOTSPUR PRESS, MANCHESTER ; AND AT LONDON.
PUBLISHED FOUR TIMES A YEAR.
PRICE TO NON-MEMBERS, 5s. NET. FREE TO MEMBERS OF THE ASSOCIATION

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Annual subscription (Sept., 1953–Aug., 1954): 12/6. Half-year subscriptions available after April 1st.

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THE LANDFORMS OF LINCOLNSHIRE†

David L. Linton*

OF all the English counties none is laid out with more engaging simplicity than Lincolnshire. Here is the familiar " scarp and vale " topography of the school text-book writers, the " belted lowland " of the geomorphologist, with two hard-rock uplands—the Heath and the Wolds—separating inner, middle and coastal lowlands floored by clays. Related to this simple pattern are some of the major geographical contrasts of the county. The clay vales are wet and badly drained, with " dry-point " villages and farms and traditionally few roads and poor, wandering tortuously from farm to farm ; they are sundered rather than unified by the larger longitudinal streams that pursue sluggish, almost bridgeless courses through them. On the nearly waterless Heath, however, and in the dry valleys of the Wolds the scanty settlement is grouped at " wet points " round wells and springs, while along the dry ridge crests run the traditional highways of the county, the Ermine Street on the Heath, the Bluestone Heath Road and the High Street along the Wold crests, and Barton Street along the eastern margin of the Wolds.

A map of any human distribution in Lincolnshire, be it land use or settlement, parish boundaries or roads, shows so strong a reflection of the belted ground plan of the county that it has long been a stock exercise in both schools and universities to investigate these relationships by the detailed analysis of one or other sheets of the one-inch Ordnance map. Such exercises are most valuable, though, as anyone who reads Professor Edwards' article will agree, they throw light on only part of the geography of modern Lincolnshire. We must, in fact, be careful not to exaggerate the consequences of the belted ground-plan of the county upon its geography. Equally we must be on our guard against undue simplification of our picture of the structural facts and physiographic events which have brought that belted ground-plan into existence. The " scarp and vale " topography of Lincolnshire departs significantly, in fact, from the text-book model. Some of the points of variation arise from considerations of geological structure and some from physiographic history. Many points, including some as fundamental as the nature and origin of the Lincoln gap, are as yet quite insufficiently understood. Yet we shall falsify and distort our view of Lincolnshire geography, and render our ideas incapable of further development or refinement, if we allow that view to be based upon an inadequate and over-simplified appreciation of the physique of the area.

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† Based upon an address given to the Spring Conference of the Association at Lincoln, on 7th April, 1953. This article, like that by Professor K. C. Edwards which follows it, is printed here at the request of, and with the aid of generous financial assistance from, the Lincoln and District Branch of the Association.

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The standard text-book account of a belted lowland envisages streams flowing from an old-land to the sea across a coastal plain built of newer sediments dipping seawards. Now because the inner part of the plain has been more uplifted than the outer, relatively old strata will here be raised above sea-level and, after a lapse of time, the main rivers flowing across the coastal plain will have lowered their channels so far that in the inner parts of the plain these channels will be cut in the relatively old strata ; as they flow seawards they will traverse progressively younger outcrops. And because the strata of the plain are of very unequal resistance to the forces of weathering and removal (in our case this is largely a matter of the contrast between coherent but well-jointed and readily permeable limestones, sandstones and ironstones on the one hand and impermeable and incoherent clays on the other) the different outcrops will be lowered unequally to give lowlands and *strike streams* on the soft rocks and uplands traversed by *water-gaps* on the hard. And because the dip is uniform these uplands will form parallel *cuestas* with steep *escarpments* facing inland and gentle *dip-slopes,* laid bare by the stripping of the overlying soft rocks, declining towards the sea. Finally, because the original rivers of a coastal plain must be assumed to be unequal, the most powerful among them will be at an advantage which will increase as its tributaries encroach on the territories drained by its neighbours, effecting *captures* in the clay vales and leaving *wind-gaps* through cuestas at the heads of *beheaded consequents.* An advanced stage of this form of drainage development is commonly referred to as *trellissed drainage.* In such a system, since the first captures to be effected are those nearest the master stream, the highest wind-gaps will also be those nearest the master stream ; farther away from it wind-gaps should be lower since they have resulted from relatively late captures, while still further along the strike vales we may expect to find streams which have remained inviolate and still cross the hard-rock cuestas by water-gaps.

Lincolnshire departs quite importantly from this simple model. A glance at the map shows that its cuestas are neither parallel nor uniform in breadth, and that an additional one is present in the north beside the lower Trent. Neither the uplands of Kesteven nor the Wolds (save in the north) show any close approximation to cuesta form, but are essentially plateau-like with rather abrupt descents at their eastern margins. Gaps there certainly are in the uplands but it is not easy to deduce any satisfying story of river capture from them. The most conspicuous gap in the Wolds, at Barnetby, has no counterpart in the Heath, while of the two well-known gaps in the Heath it is the northern one at Lincoln which is a water-gap and the one at Ancaster, considerably more remote from the Humber master stream, which has become a wind-gap. The lowlands with their longitudinal streams Trent, Ancholme and lower Whitham, may be held to conform with the trellis pattern of drainage, but the valley systems within the principal uplands in Kesteven and the central Wolds suggest patterns of quite different origins. Finally we may note that the coastal lowland east of the Wolds is in origin quite unlike the soft-rock lowland at the eastern margin of a normal coastal plain. Some of these departures from the model case are readily explicable in terms of lithology and structure ; the others are consequences of a long physiographic evolution of which some chapters are almost unknown to us. We cannot therefore explain them all, but it may be helpful if we review them in turn.

The Heath and Adjoining Vales.

We may note first the extraordinary convergence of the Heath and Wolds towards the Humber. The Heath, built of the Lincolnshire Limestone series runs almost north and south and for more than a score of miles is never far from the meridian 0°33′ W. The Wolds are more irregular but the overall trend of their western margin is about 30° west of north and the general strike of the base of the Chalk is about N39° W. Put differently this northward convergence of the cuestas means the southward broadening of the mid-vale from just over two miles at the Humber to 25 miles or more in the Fens. Some of this broadening is certainly due to a lower eastward dip of the strata in the south, but the greater part is due to the southward thickening of the three clay formations that underlie the vale. The two lower of these, the Oxford and Ampthill Clays, aggregate more than 500 feet in thickness below the Fens but less than half that towards the Humber. The third member, the Kimmeridge Clay, thins from over 300 feet in the south to practically nothing at the Humber. The mid-vale is thus wedge-shaped in plan because it is developed from the outcrop of clay formations which are wedge shaped in section and some four times as thick at the southern as at the northern end. This northward thinning is an original feature of these clay formations ; much more mud accumulated on the sea-floor in the area that is now the Fens than in the Humber region, and that for a very good reason. In the former area the sea-floor was steadily subsiding and constantly making room for more sediment. Near the Humber the sea remained constantly shallow and at times the sea-floor actually rose ; consequently very little sediment could accumulate without being disturbed again by waves and currents. After the deposition of the Kimmeridge Clay the rising tendency on the Yorkshire side of the Humber became very marked, and where Market Weighton now stands the three clay formations, such as they were, and the underlying rocks that in Lincolnshire build the Heath, were eroded completely away so that the base of the Chalk came to rest on the Lower Lias clay. This means that for a space of some 16 miles in Yorkshire the outer cuesta of our belted lowland directly overlooks the inner vale, and the inner cuesta and mid-vale are completely extinguished. If we look further north we shall find these two features re-appearing as the North Yorkshire Moors and Vale of Pickering respectively. If we trace the Heath and mid-vale southwards out of Lincolnshire across the English Plain we shall find that at their south-western extremities these features are again overstepped by the outer cuesta, so that in

East Devon as in East Yorkshire the latter looks down upon the red Triassic marls of the inner lowland. In other words the convergence of our cuestas in Lincolnshire is no local abnormality but a part of the major structural pattern of the English Plain.

In its course southward from the Humber, the Heath is in general both straight and narrow. It is narrowest in the north where a relatively high dip (about 150 feet per mile or 1½°) combines with a rather small thickness of the cuesta-building rocks (only 105 feet) to give a breadth of only 2½ miles. Southwards the thickness increases slowly to about 180 feet near Cranwell, but the outcrop broadens more than proportionately to about 7 miles because, at the same time, the dip diminishes to only 50 or 60 feet per mile. However, throughout this run of about 50 miles from the Humber the Heath remains a true cuesta with a very regular escarpment and dipslope. Somewhere around Grantham all this is changed. The cuesta which has never reached an altitude of 300 feet broadens and rises rapidly into a plateau a dozen miles wide, with a general elevation of 400 to 600 feet. These are the uplands of Kesteven and Rutland. They are deeply scored by large valleys and their western edge overlooking the lowlands of Leicestershire is far too irregular and broken to be at all readily recognised as an escarpment. Basically these striking changes of relief result from a reduction of the eastward dip to near horizontality, coupled with a measure of gentle flexuring on east-west lines.

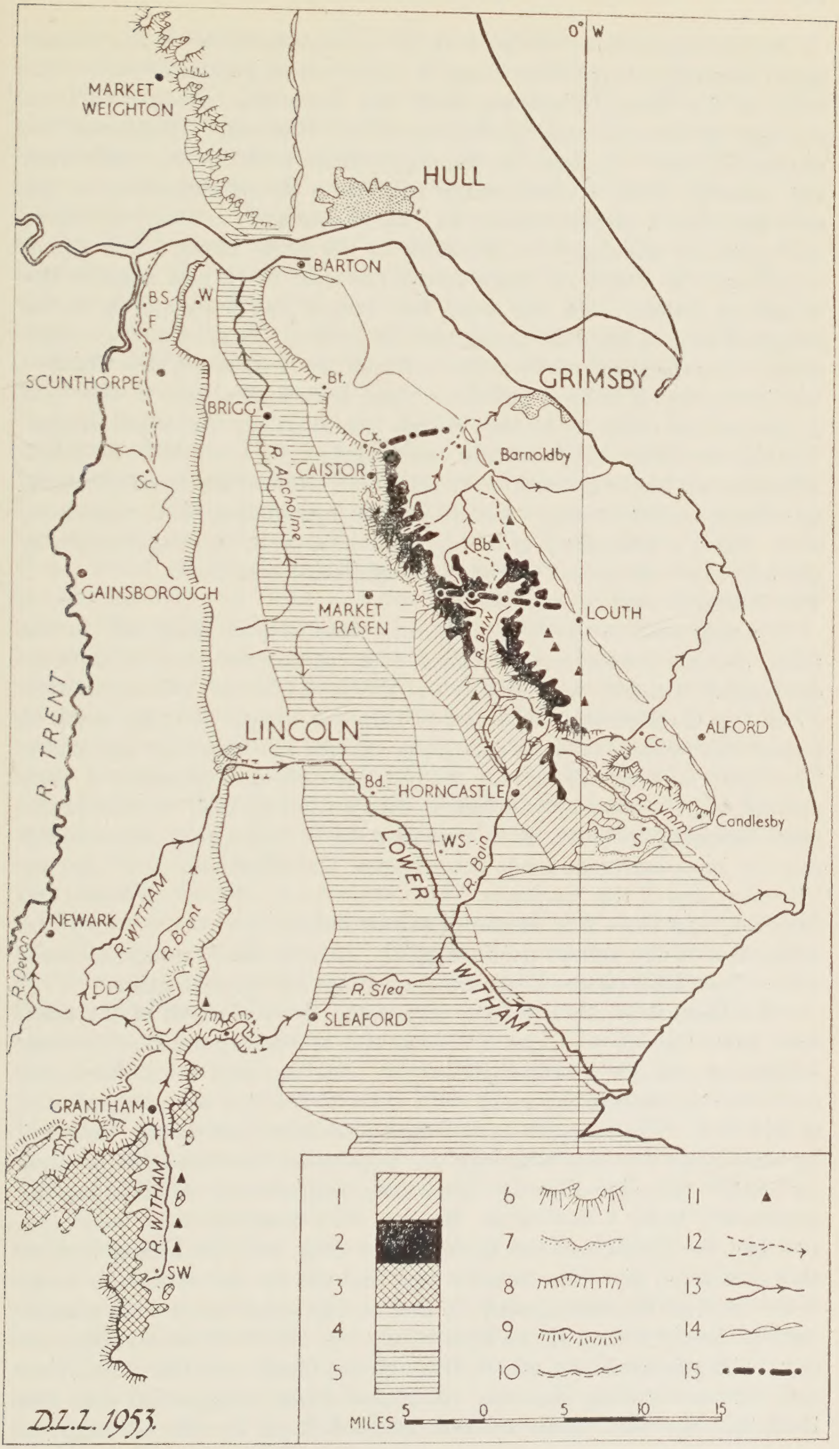
In the far northwest of the county a complication of a different kind is found. Between the Heath near Winterton and the course of the Trent is an additional cuesta which is just as high and prominent as the Heath itself, and, where its scarp is undercut by the Trent at Burton-upon-Stather, a good deal steeper. This feature is built by the Lower Lias. In south Lincolnshire this is a thick formation of shales and clays, but in the north, from Scotter to the Humber, shallow-water limestones predominate and these it is that build the Burton Cliff. Between this subsidiary cuesta and the Heath is a narrow clay vale drained by the Winterton Beck. At the base of the clays which underlie it and extending westwards up the dip-slope almost to the scarp crest is the important Frodingham ironstone which is worked opencast along about six miles of outcrop and is the economic *raison d'être* of Scunthorpe.

Fig. 1.—Some Lincolnshire Landforms

Key.—1. Boulder clay-covered western slope of Southern Wolds. 2. 450–500 ft. plateau surface of Central and Southern Wolds. 3. Plateau surface of Kesteven uplands. 4. Outcrop of Kimmeridge Clay. 5. Outcrop of Ampthill and Oxford Clays. 6. Escarpment of Chalk. 7. Escarpment of Lower Cretaceous limestone or sandstone. 8. Escarpment of Lincolnshire Limestone. 9. Escarpment of Middle Lias (Marlstone). 10. Escarpment of Lower Lias. 11. Hilltops rising nearly to levels of 2 and 3. 12. Dry valleys. 13. Existing streams. 14. Pleistocene sea-cliffs. 15. Northern and southern boundaries of Central Wolds.

Bb—Binbrook ; Bd—Bardney ; Bt—Barnetby-le-Wold ; BS—Burton-upon-Stather ; Cc—Calceby ; Cx—Clixby ; DD—Dry Doddington ; F—Flixborough ; I—Irby ; S—Spilsby ; Sc—Scotter ; SW—South Witham ; W—Winterton ; WS—Woodhall Spa.

Note.—The Ancaster gap lies at the head of the river Slea and 7 miles north-east of Grantham.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SCUNTHORPE
GRIMSBY
Bt.
BRIGG
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CAISTOR
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Sc.
R. Ancholme
Bb.
GAINSBOROUGH
MARKET RASEN
LOUTH
R. BAIN
R. TRENT
LINCOLN
Cc.
ALFORD
Bd.
HORNCASTLE
R. Lymn
Candlesby
S
WS
R. Bain
LOWER
WITHAM
NEWARK
R. WITHAM
R. Brant
R. Devon
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D.L.L. 1953.

The southern shore of the Humber is thus bordered in very short space by a remarkable alternation of three cuestas and three vales—the vales of the Trent, Winterton Beck and Ancholme, overlooked from the east by the escarpments of Burton Cliff, Winterton Heath and the northern Wolds. A glance at the map will show that a few miles from the Humber each of these scarps exhibits a strong deflection to the east and then a marked return to a more southerly course. All three are evidently affected by a flexuring of the rocks along a line which runs from the Trent at Flixborough towards Brigg and reaches the Wolds at Caistor. In the west the flexure has been shown to be synclinal and in the east monoclinal in nature. It is of course, more recent than the youngest formation affected by it—namely, the Chalk—but it is possible that it reflects a deep seated structure in the Coal Measures and older rocks that act as basement for the whole region. The effects visible at the surface could easily reflect a WNW–ESE line of fracturing in the foundation rocks which allowed the basal platform to subside on the northern and to remain upstanding on the southern side. Such a possibility is of high importance in the exploration of the eastward extensions of the Nottinghamshire coalfield.

The Northern and Central Wolds.

Turning now to the Wolds we may note at once that only in the north do they conform to our ideas of a cuesta, and that we have to distinguish Central and Southern Wolds of other characteristics. From the Humber to the hamlet of Clixby a couple of miles north of Caistor the Wolds possess a simplicity of form not found further south. The scarp is bold though of modest altitude and presents a very smooth front to the clay vale below, except at one point. At this point, near Barnetby-le-Wold, it is breached by a large gap, upon which railway lines converge from Scunthorpe, Gainsborough and Lincoln. The crest line of the Northern Wolds achieves no altitude greater than 340 feet, and from it a simple dip-slope mildly furrowed by only the shallowest of dry valleys declines gently towards the Humber lowland, where the Chalk passes imperceptibly under the glacial drifts.

The Central Wolds are quite different. A little north of the main road from Caistor to Grimsby (A46) the Wolds almost double their width and add 200 feet to their height. For the next ten miles to the south the altitude at the scarp crest exceeds 450 feet with a maximum of 548 feet. The scarp is bolder than elsewhere and deeply indented by obsequent combes, but only the uppermost fraction of it is made by Chalk. A wedge of Lower Cretaceous strata which thickens rapidly southward from a few score to over two hundred feet intervenes between the Chalk and the Kimmeridge Clay, and the harder beds in this succession give rise to their own features on the composite scarp face. Behind the escarpment we find no dip-slope but a wide plateau surface deeply scored by valleys. Only the lesser of these valleys are dry ; the principal ones all cut through the Chalk into the clays below and contain flowing streams. Moreover these valleys fall into two branching systems which are not directed down the dip as might be expected, but northwards. By this means all the drainage of the area is concentrated upon two closely adjacent outlets and emerges from the Wolds as the Irby and Barnoldby becks. The altitude of the plateau is maintained above 400 feet almost to their eastern margin where there is an abrupt descent to the lowland whose beginning is here marked by the old road known as Barton Street and by the 150-foot contour. This abrupt and almost rectilinear eastern margin to the Wolds leads down to a hummocky plain of boulder clay and boulder clay is extensively plastered against the lower slopes. Were this boulder clay removed we should see this bluff line for what, in origin, it really is—a line of white sea-cliffs truncating the Chalk spurs and attacked at their bases by the waves of the North Sea of a time before the boulder clay was laid down. The coast would much resemble that of Sussex to-day between Brighton and Beachy Head with a wave cut platform, like that on which Beachy Head lighthouse stands but vastly more extensive, stretching out to sea for many miles beneath the waters. This platform is proved by numerous borings through the boulder clay and marine alluvia that underlie the Inner Marsh and Outer Marsh, at depths which are a little below modern sea-level near the old cliff-line and 70–80 feet below O.D. in the region of the present coast. Thus the " outer lowland " of our belted coastal plain is not made, like the London and Hampshire Basins further south, by rocks which normally succeed the Chalk and rest upon the lower parts of its dip-slope. Such rocks do not occur anywhere in either Lincolnshire or Yorkshire, though to be sure they may be present somewhere off-shore beneath the waters of the North Sea. The coastal lowlands of Lincoln Marsh and Holderness are alike in being underlain by glacial and post-glacial deposits which rest everywhere on a wave-cut platform eroded wholly in Chalk.

The Southern Wolds.

The Southern Wolds comprise an area of hilly country some ten miles by fifteen clearly marked off from the mid-vale on the west, the Marsh on the east, and the Fens on the south, and merging into the Central Wolds roughly along the line of the main road (A157) from Lincoln to Louth. So far are they from being a Chalk cuesta that less than half their area is Chalk, and in the skyline that you see before you as you approach from the Witham crossings at Bardney or Woodhall Spa, the Chalk has no part whatever. In fact if we draw the NW–SE diagonal of the rough parallelogram that is the Southern Wolds the Chalk lies wholly to the north and east of it. On the south-west side of this diagonal the country is built of Lower Cretaceous rocks, here 200–250 feet thick and as thick as the Chalk itself. At the base of this succession is the Spilsby sandstone, some 70 feet thick and sufficiently cemented to form a belt of high ground which maintains its crest line at over 400 feet for several miles. Above the Spilsby sandstone comes a varied succession of clays, marls and sands which have proved sufficiently yielding to the forces of erosion to permit the development of a strike vale along their outcrop. Most of this vale has doubtless been opened out by the southeast-flowing River Lymm, but this stream has since incised itself well below the floor of the vale and cut through the Spilsby sandstone into the Kimmeridge Clay below. To the east of this vale is the composite escarpment which is capped by the brown Carstone, some 20 feet of Red Chalk (which fully deserves its name and is believed to owe its red colour to lateritic mud washed into the Cretaceous sea from a nearby land experiencing tropical weathering) and the more normal White Chalk. The crest of this scarp just fails to reach 500 feet but maintains a height over 450 feet for many miles. It is in fact followed by the Bluestone Heath road from the Central Wolds southward until the Chalk feature (and outcrop) is broken by the double breach at the head of the Calceby Beck. South of this the Chalk continues for a few miles but fails to rise as high as the Spilsby sandstone feature to the west. The latter in fact forms the natural continuation of the Bluestone Heath crest and it is clear that both are remnants of a 450–500 foot plateau surface that was cut indifferently across the various rock outcrops. Such a surface must be related to a former base-level of erosion and could quite conceivably be a wave-cut surface like that which underlies the boulder clay of the Marsh.

A significant feature of the drainage pattern of the Southern Wolds suggests that this may well have been the case. We have seen that the Central Wolds are drained by a valley system whose arteries are directed northwards, and whose headstreams rise along a roughly east-west watershed which crosses the Wolds very close to the Louth–Market Rasen road (A631). Along this same watershed rise the headstreams of the largest stream of the whole Wold region, the river Bain which flows due southward in a valley which cuts against the dip from the Lower Chalk, through all the Lower Cretaceous beds, to the Kimmeridge Clay of the mid-vale. At Horncastle it is joined by the diminutive " river " Waring which rises on the Chalk scarp and occupies a sizeable gap through the Spilsby sandstone feature at Belchford ; and to the east of this again is the north-south 400 foot ridge which has been a divide ever since dissection of the plateau surface began. These features all find a ready explanation if we assume that the 450–500 foot plateau surface was in fact a plane of marine erosion and that when it was uplifted to form dry land the new drainage ran north and south from a slightly upwarped divide running east from Market Rasen. Such a hypothesis is the more attractive in that it is not special to Lincolnshire, but merely an extension to Lincolnshire of the view that has already proved so helpful in understanding the pattern of drainage in the South of England—namely that much of it was initiated by the uplift of a marine plane fashioned in late Pliocene times.

One more feature of the Southern Wolds deserves notice—namely, the contrast of their eastern and western margins. Here is no contrast between scarp and dip-slope, for neither margin can be so described, and it is the eastern which is the steeper of the two. The road westwards out of Alford rises from 50 to 318 feet in less than two miles; to rise through the same interval from the mid-vale to the western plateau margin takes about six miles. The reason is not far to seek. As in the Central Wolds the eastern border is the old line of sea-cliffs partly worn back and partly buried in boulder clay, but still rectilinear and abrupt. The western margin on the other hand is a sort of broad glacis which, except where it is cut across by the Bain and one or two other streams, rises in a broad sweep from the Witham to the plateau edge and is mantled with boulder clay. This boulder clay, unlike the reddish-brown and purple-brown clays of the Marsh, is made largely of chalk debris and is regarded by the Geological Survey as belonging to an older glaciation[1]. Reason for this is well seen in the relations of the two boulder clays to the old cliff line. At Candlesby at the south-easternmost extremity of the Wolds this cliff-line turns the corner and intersects the Chalk escarpment, crosses the valley of the Lymm and then truncates the feature made by the Spilsby Sandstone and the long western slope of Kimmeridge Clay with its cover of Chalky Boulder Clay. The cliff line is evidently younger than the Chalky Boulder Clay into which it is cut, and older than the brown clay of the Marsh which is piled against it. This is in keeping with the fact that while the Bain and other streams of the mid-vale have cut valleys through the Chalky Boulder Clay into the Kimmeridge Clay below, the boulder clay of the Marsh still retains with little modification the hummocky form and unorganised drainage it inherited from the last ice mass to invade Lincolnshire. On the western edge of the Fens the old cliff line is also found developed against the Kesteven uplands. There it would appear to be younger than the spurs which it truncates and therefore also younger than the outliers of Chalky Boulder Clay which cap the higher parts of those spurs; its relations to the reddish boulder clay which occurs at low levels between Lincoln and the Fens near Sleaford appears not to be known.

The Drainage Pattern and the Problem of the Gaps.

Anyone who traces the course of the river Witham on a large scale map is likely to find it abnormal. Rising in the south-westernmost corner of the county, it flows due north for about 15 miles to the western end of the Ancaster gap. A. J. Jukes-Browne inferred that in post-glacial times it turned eastward here and flowed through the gap to Sleaford[2]. Be that as it may, to-day it turns in the opposite direction—westwards—and enters the Vale of Trent. In a couple of miles it crosses the 100-foot contour, and at this point a dam only a few feet high would turn its waters northwards down the course of the Brant (whose head is only three or four hundred yards away) straight to Lincoln. The Witham, however, holds on westwards through a low ridge which at Dry Doddington rises to 152 feet. If it held this course a little further it would join the Devon and the Trent, but perversely it again turns aside, this time to the northeast round the Dry Doddington ridge, to join its own tributary the Brant, whose straight course it continues to Lincoln. There it passes eastwards through the famous water gap in the Heath, but after only a few miles turns south-eastward to reach the Wash in the latitude of Grantham, having collected on the way the little river Slea which flows from the eastern end of the Ancaster gap.

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[1] A. J. Jukes Browne. "The Geology of East Lincolnshire." *Mem. Geol. Survey.* (Sheet 84.) 1887.

[2] A. J. Jukes-Browne. "Lincolnshire." *Geology in the Field*, Geol. Assn. Jubilee vol., 1910, pp. 488–517.

This remarkable course cannot be the product of the kind of normal evolution that leads to a trellissed drainage. There is in fact good reason for supposing that the Witham as we now see it has been put together by circumstances that have nothing to do with normal drainage evolution but arose during one or other of the glaciations of Lincolnshire. It has been amply demonstrated that the valley of the Witham at its extreme head, between the villages of North and South Witham, is younger than the Chalky Boulder Clay in which it is cut[3,4]; and it would be hard to point to any other section of the course just described which is not as young as, or younger than, the headwater section.

But if the Witham is so young, what is the origin of the Lincoln and Ancaster gaps? Were they cut by ancient rivers that, as Professor Swinnerton has supposed[5], carried the former drainage of the south-eastern flanks of the Pennines to the North Sea, crossing the Heath at Lincoln and Ancaster? Or did they originate as F. W. Harmer long ago suggested as successive overflows of the waters of a lake impounded by ice in the Vale of Trent[6]? Neither view is wholly acceptable. We may concede that glacial meltwaters have played a large part in bringing both gaps to their present form and low level; but each must have existed as a wind-gap which offered the lowest available spilling point for the waters of a Trent valley lake at the moment when overflow occurred. And such wind-gaps must earlier have been water-gaps, cut by just such eastward-flowing rivers as Professor Swinnerton envisaged. He appears to favour the view that these rivers originated on a surface of Chalk when that formation, which is now confined to eastern Lincolnshire, still survived even west of the Trent. This view is similar to that put forward at the beginning of the century by F. Cowper Reed for the rivers of east Yorkshire[7], where the Market Weighton gap is (though in the Wolds) a sort of counterpart to those of Lincoln and Ancaster. But for reasons which it would be inappropriate to argue here it is most

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[3] P. E. Kent. "Notes on the River Systems and Glacial Retreat Stages in South Lincolnshire." *Proc. Geol. Assoc.*, vol. 50, 1939, pp. 164–167.

[4] G. A. Kellaway and J. H. Taylor. "Early Stages in the Physiographic Evolution of a Portion of the East Midlands." *Quart. Journ. Geol. Soc.*, London, vol. cviii, 1953, pp. 343–376.

[5] H. H. Swinnerton and P. E. Kent. *The Geology of Lincolnshire.* Lincolnshire Naturalists' Union, Lincoln, 1949.

[6] F. W. Harmer. "On the Origin of Certain Cañon-like Valleys associated with Lake-like Areas of Depression." *Quart. Journ. Geol. Soc.*, vol. lxiii, 1907, p. 470.

unlikely that any rivers which had been superimposed from a Chalk cover should have escaped river capture when the clays of the inner and mid-vales were uncovered. This is especially true of the river which may be supposed to have cut the Market Weighton gap, since this is only a dozen miles from the Humber, the master stream of the whole region. How could an old consequent river survive to keep this gap open when the Ouse had supposedly effected captures of other Yorkshire rivers further north?

The way out of this impasse appears to lie in a suggestion to which Professor Swinnerton made passing reference in his Presidential Address to the Lincolnshire Naturalists' Union in 1937[8]. He there envisaged the possibility that his Lincoln and Ancaster rivers had originated "in late Tertiary times, when the Pliocene sea transgressed over the area under consideration and planed its surface." We have already noted that the Wolds are bevelled by a planed-off surface, now at a height of 450 to 500 feet above the sea, which cuts across all the rock horizons from the Spilsby Sandstone to the Middle Chalk, and that some features of the Wold drainage are most reasonably explained by assuming that they originated when this planed-off marine surface was uplifted and became dry land. We may now extend this view a little and envisage the Lincoln river to have continued eastward by the south end of the Wolds, receiving the Bain and the Waring as left-hand tributaries. Further south the Ancaster river would have flowed across 30 miles or so of clay flats to the Wash and inevitably the traces of its passage are lost. In the north the streams of the Binbrook and Swallow valleys doubtless joined the eastward-flowing river that passed over the site of the present (glacially modified) Barnetby gap. We mentioned at the outset that this gap has no counterpart on the Heath, but this can be seen now as an expectable state of affairs. A stream flowing eastward on the uplifted sea-floor from where Scunthorpe now stands toward Barnetby, would surely not long survive before suffering capture by an outgrowth of the Humber which flows on a parallel course only 6–8 miles away. Such a capture would produce a wind-gap at a relatively high level, and doubtless above the level of the present very even crestline of the northern Heath; in the wearing down of the country to the level represented by this even crestline all trace of the former wind-gap would be destroyed.

Our discussion of Lincolnshire landforms has been wide-ranging and at times possibly a little technical, though we have endeavoured to steer clear of the worst technicalities by avoiding discussion of the glaciation of the county. We may perhaps best draw together the threads of the discussion by a very simple generalisation. The landforms of Lincolnshire owe their genesis and characteristics to two very

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[7] F. Cowper Reed. *The Geological History of the Rivers of East Yorkshire.* London, 1901.

[8] H. H. Swinnerton. "The Problem of the Lincoln Gap." *Trans. Lincolnshire Naturalists' Union* for 1937, pp. 145–153.

different sets of processes operating at two very different periods of earth history. On the one hand the broad lines of their nature and arrangement were determined—pre-determined, if you prefer—by the happenings on the sea-floors of Jurassic and Cretaceous times, 150--100 million years ago. On the other hand the actual realisation of the possibilities inherent in the nature and arrangement of the rocks then laid down would appear to have been the work of normal and glacial erosion in the relatively brief period since the uplift of the Pliocene sea-floor, possibly not more than ten million years ago.

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CHANGING GEOGRAPHICAL PATTERNS IN LINCOLNSHIRE †

K. C. Edwards*

IT is common knowledge that in Lincolnshire the siting and distribution of many of the " human " features, such as settlements and roads, bear a close relationship to the prevailing trend of the successive rock formations which form the surface of the county. The spatial patterns imparted by this relationship have persisted through the centuries to a remarkable degree. To cite an example close to Lincoln itself there is the Ermine Street. This is one of the oldest features of the cultural landscape yet long sections of it are still in use as a modern highway running for many miles in a north-south direction along the dry elevated ground formed by Lincolnshire Limestone. The absence of settlements along the actual Street and the occurrence of villages in lines both to the east and west of it at fairly regular intervals of 1½ to 2 miles, sited in relation to water supply, is a simple example of a long-established geographical pattern. The Ermine Street is of Roman date while the villages are mainly of Scandinavian or Saxon origin, those to the west being located on a spring-line on the face of the Lincoln Cliff escarpment, those to the east occurring either on small dip-slope streams or at points within close reach of the water-table by means of wells.

Naturally these villages no longer depend upon their original supply of water, for larger quantities from more reliable sources are now required. Reference to the present Rural District supplies serving a group of settlements just north of Lincoln (Fig. 1)[1] shows that water

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† Based upon an address given to the Spring Conference of the Association at Lincoln, on 8th April, 1953.

* Professor of Geography in The University of Nottingham.

[1] Based on information from an unpublished thesis on *The Lincoln District* by James Bell (1952) by permission of the author.

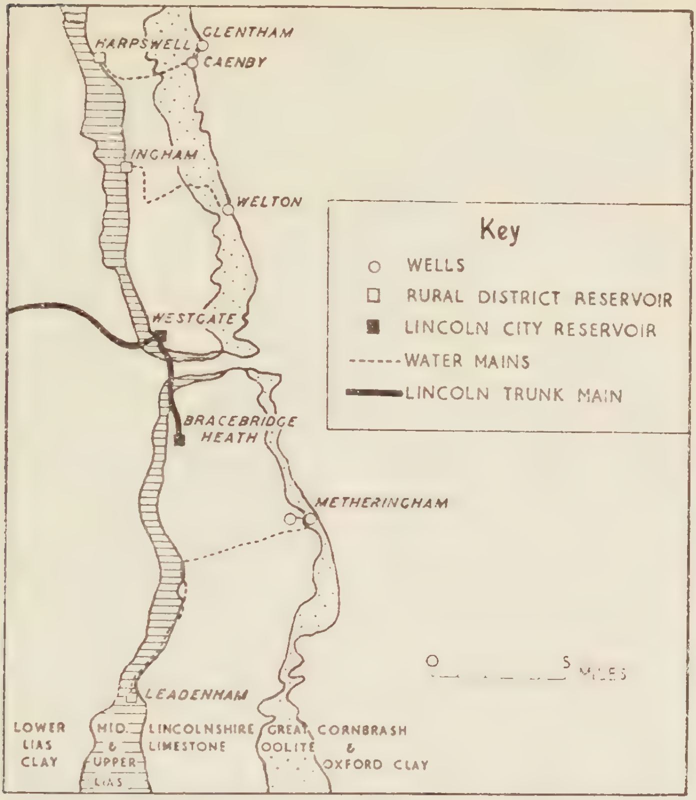

Fig. 1.—Lincoln District Water Supply

obtained from modern wells in the limestone is pumped to reservoirs placed near the crest of the Cliff for gravitation to the villages. The far greater quantities required for the city itself are brought from deep bores in the Bunter Sandstone of north Nottinghamshire and raised to the large service reservoirs at Westgate and Bracebridge Heath on either side of the Witham gap. Although very minor ones, these reservoirs are current features of the cultural landscape and together with the wells which feed them illustrate the existing relationship to physical conditions. Their distribution again shows a north-south arrangement, a case in which the old geographical pattern persists in a new guise.

We may next refer to a still more recent feature of the Lincolnshire landscape, the aerodrome. Eastern England for strategic reasons is the region of maximum aerodrome distribution in the country as far as the R.A.F. is concerned and in Lincolnshire they are particularly numerous, mostly bomber stations and therefore large in area, though it must be said that there is little difference to-day between the size requirements of bomber and fighter stations. Since aerodromes may range from 300 to 600 acres in size, their significance in the landscape

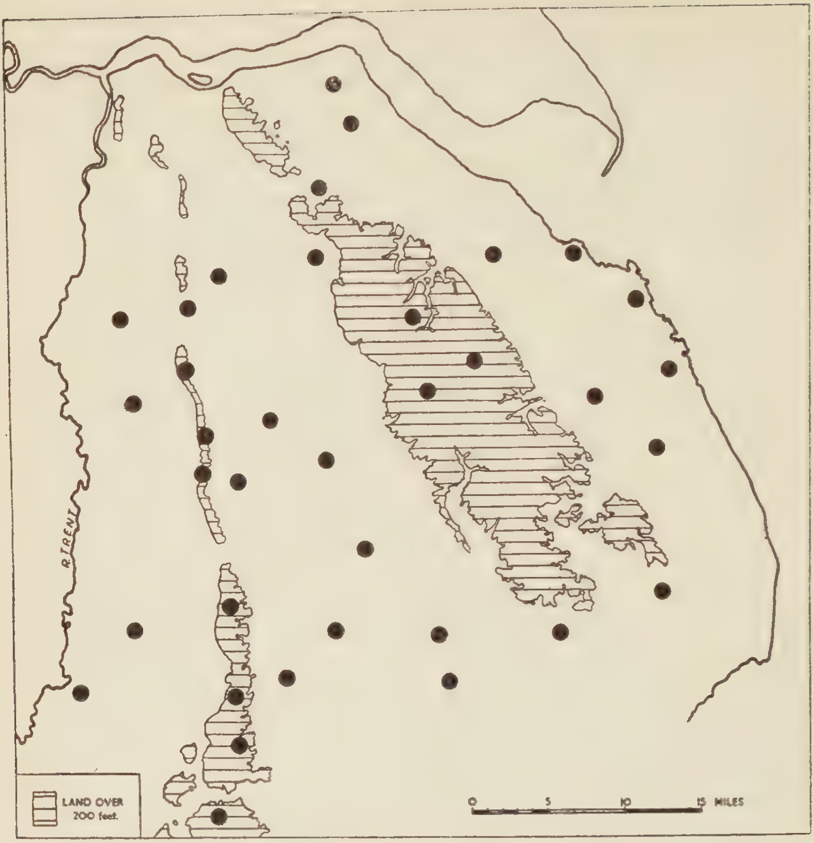

Fig. 2.—North and Central Lincolnshire : R.A.F. stations.

apart from their characteristic details is shown by the fact that in the part of Lincolnshire under review there are over thirty stations occupying 18,000 acres of land, more than 2 per cent. of the total area. The essential requirements for an aerodrome are a large flattish tract of firm ground, a still larger obstacle-free approach area and good road access for the conveyance of fuel and supplies ; comparatively elevated sites are advantageous in reducing the liability to radiation fog.

In Lincolnshire the relatively open and spacious surfaces of the Heath and Wolds fulfilled these conditions and the older stations, dating from the first world war and shortly afterwards, were located upon these areas of high ground, their distribution being in alignment with the outcrops of limestone and chalk respectively (Fig. 2). The use of sites near the west-facing scarp in each case often proved advantageous to aircraft taking off into the prevailing wind. Once more the north-south pattern was repeated.

In more recent years however, particularly from 1937 onwards, the need for multiplying the number of air bases brought a modification

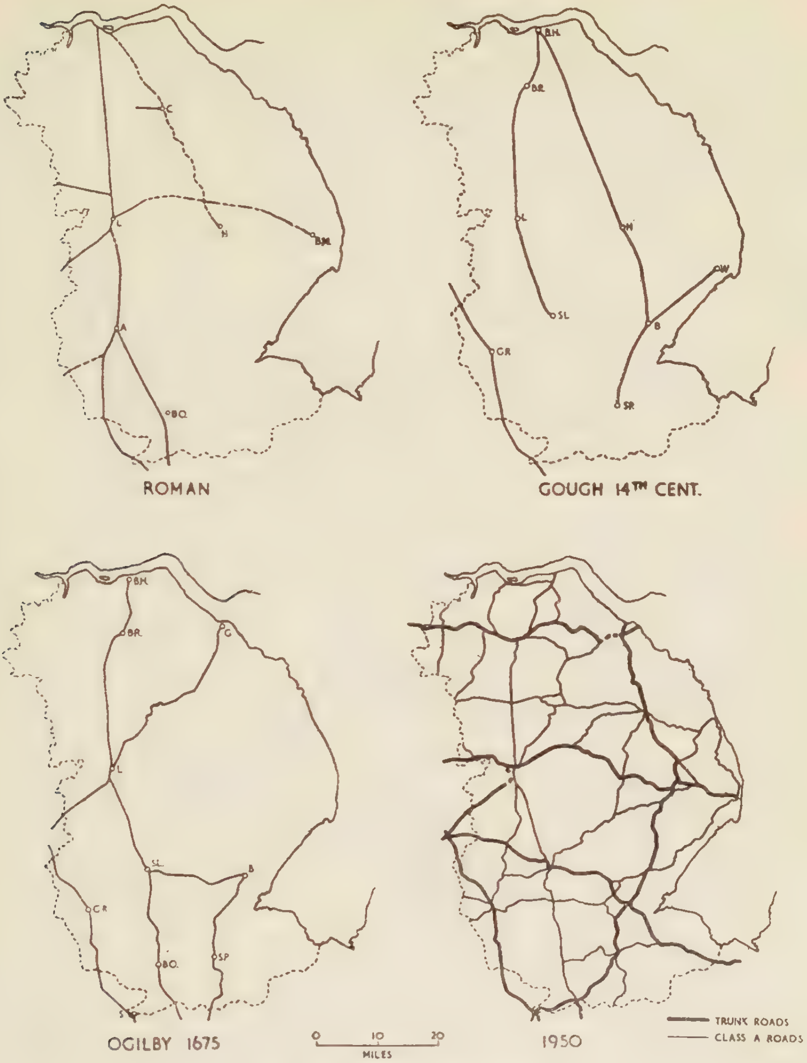

Fig. 3.—Lincolnshire Roads.

in the pattern of distribution. New techniques in flying (e.g., radio and radar control) and new methods of airfield construction reduced the importance of the earlier requirements and the later stations became established on high and low ground alike and upon varied types of surface. Even in the period of maximum expansion during the second war however, there was a general avoidance of the Fenlands, partly because of their value for food production and partly on account of their intricate system of dykes and drains which would present special problems to the building of air bases.

The two examples just referred to, an old one in the case of settlement and water supply and a modern one in the case of aerodrome distribution, are instructive in showing that with changing techniques the geographical pattern may in some circumstances persist or, what is more frequent perhaps, may be substantially altered. In fact to interpret the different patterns of distribution in relation to stages of technical development is a task of absorbing interest in the study of the cultural landscape.

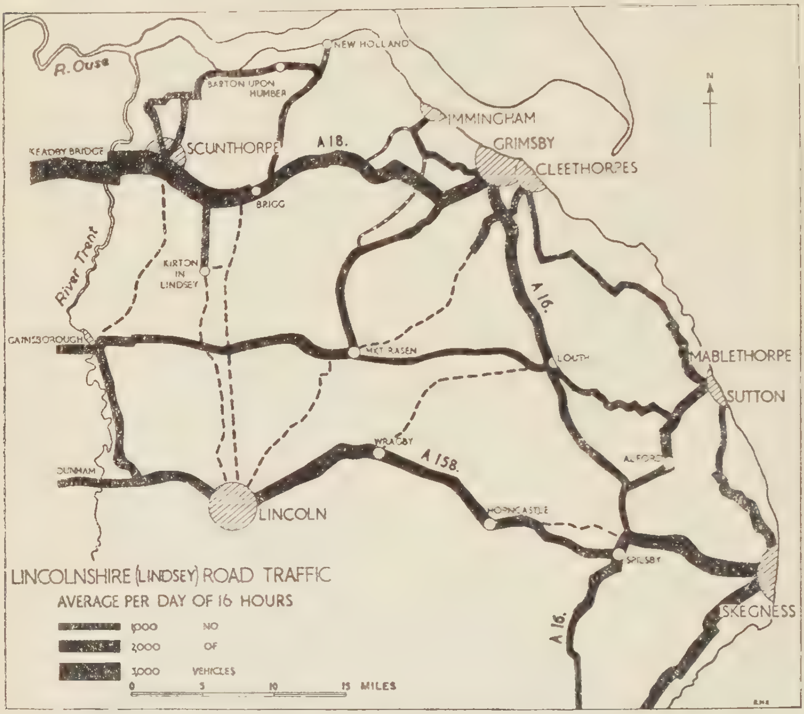

Fig. 4.

Roads and railways in Lincolnshire clearly illustrate this point. Reference to Fig. 3 shows that while the early highways were mainly north-south in direction, at a later stage significant east-west elements appeared in the network, while the present-day system includes three trunk roads running east-west (Doncaster–Grimsby; Lincoln–Skegness; and Newark–Sleaford–King's Lynn) and only two running north-south (Great North Road and Peterborough–Boston–Grimsby). Further emphasis is given to the present day east-west trend by the road traffic diagram for Lindsey (Fig. 4)[2] which reflects the large volume of commercial and passenger coach movement now directed towards the coast.

Of all the highways traversing the county, the two now carrying the heaviest traffic are those, which after crossing the Trent towards Lincoln and Scunthorpe respectively, strike eastwards to the coast. The more northerly of these (A 18) which connects Grimsby and Immingham Dock with Scunthorpe, Doncaster and the mining area of South Yorkshire has become an important industrial artery using the same crossing over the Trent at Keadby as the railway, the bridge being rebuilt in 1916 as a dual purpose structure. Industrial expansion in the Scunthorpe district is also reflected in the considerable volume of local traffic between the town and the smaller centres of Keadby, Brigg and Barton-on-Humber.

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[2] Based on information supplied by the County Planning Officer, Mr. R. L. Stirling, M.P.T.I. To Mr. Stirling and his colleague, Mr. P. C. Benneworth, special thanks are due for their help in the preparation of this paper.

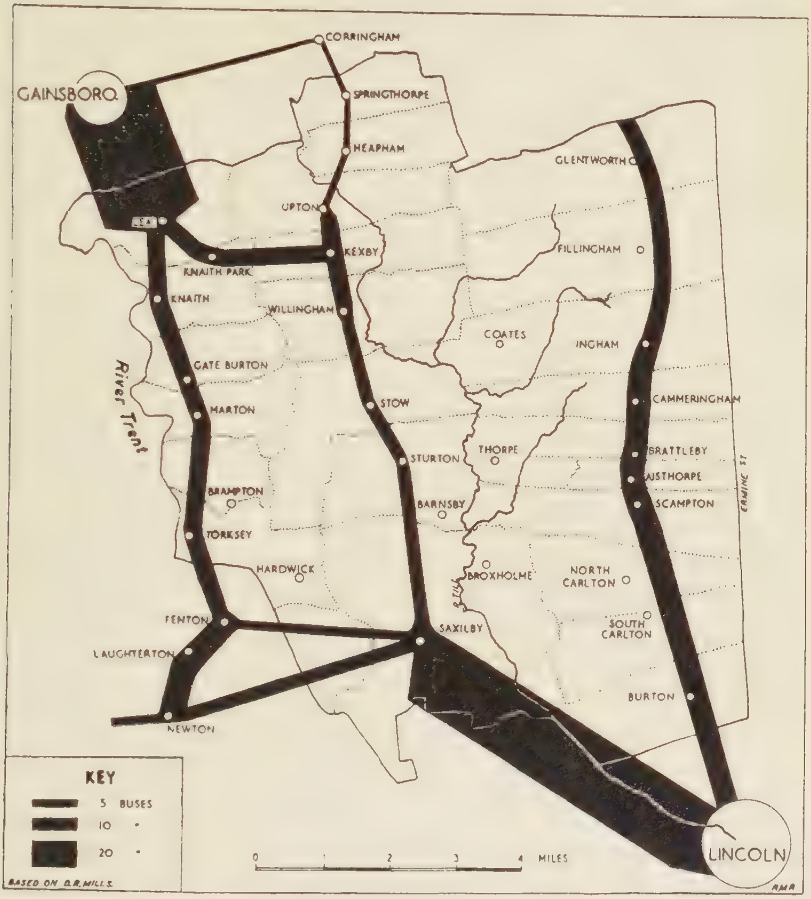

Fig. 5.—Till Basin : flow diagram of bus services.

The data mapped in Fig. 4 show that over much of the county movement along traditional north-south routes is now subordinate to that trending east-west. Locally however, the old pattern survives, a good instance being the roads used by local bus services connecting the villages of the Till basin between Lincoln and

Gainsborough (Fig. 5)[3]. Here the early north-south trend based on fundamental physical relationships has re-asserted itself in the present era of transport.

The railways of the county testify even more eloquently to the inter-relations of technical development and change of geographical pattern. By 1851, as depicted in the map accompanying the national census of that year, the general arrangement of industrial concentration over the country was already established but apart from minor activities (flourmilling, malting, ropemaking) there was no industrial production in Lincolnshire. Neither did the earliest railways encourage such activity. The first line, that of the Great Northern Co., which passed through Grantham from London to York, and the second which left the former line at Peterborough and struck across to Boston and thence on to Grimsby hardly affected the main parts of the county. Shortly afterwards however, railways provided an impetus to industrial development by conveying into Lincolnshire, coal, steel and foundry iron by a number of routes which struck eastwards across the Trent from the mining and manufacturing areas of the Midlands and North (Fig. 6—1872). Thus in turn the agricultural engineering of Lincoln, Gainsborough and Grantham, the fish trade and ancillary industries of Grimsby, iron and steel production at Scunthorpe and the exploitation of secondary minerals (lime and chalk for cement at Barnetby, Kirton-in-Lindsey, etc.) all received a direct stimulus. These later railways across the Trent, some converging upon Lincoln, others taking an independent route, such as the Manchester, Sheffield and Lincolnshire line which in 1861 effected the lowest crossing of the river, at Keadby Bridge, initiated a new trend across the physical grain of the county. This trend became further emphasised by lines reaching to the coast (thereby fostering the growth of resorts) and is now symbolically expressed by the multiple tracks on the section of line traversing the Barnetby gap through the northern Wolds.

At this point, a glance at the map (Fig. 7)[4] showing population changes in Lindsey for the period 1921–49 will prove instructive. While the population of the county as a whole has increased steadily throughout the period, in many of the rural areas there has been some decline, notably in the Wolds and other interior districts. This decline is due partly to changes in the character and methods of farming, as a result of which fewer men are employed on the land, without however impairing production, and partly to movement towards the towns, which of course is characteristic of many parts of England.

The small market towns of which there are many throughout Lincolnshire have remained almost stationary as regards number of inhabitants ; some indeed have even fewer than at the beginning of the century. The following table gives examples of small towns

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[3] The author is indebted to Mr. D. R. Mills for permission to base this diagram on data given in the latter's dissertation (unpublished) on *Settlement Patterns in the Till Basin* (*Lindsey*), 1952.

[4] Based on information supplied by the County Planning Officer.

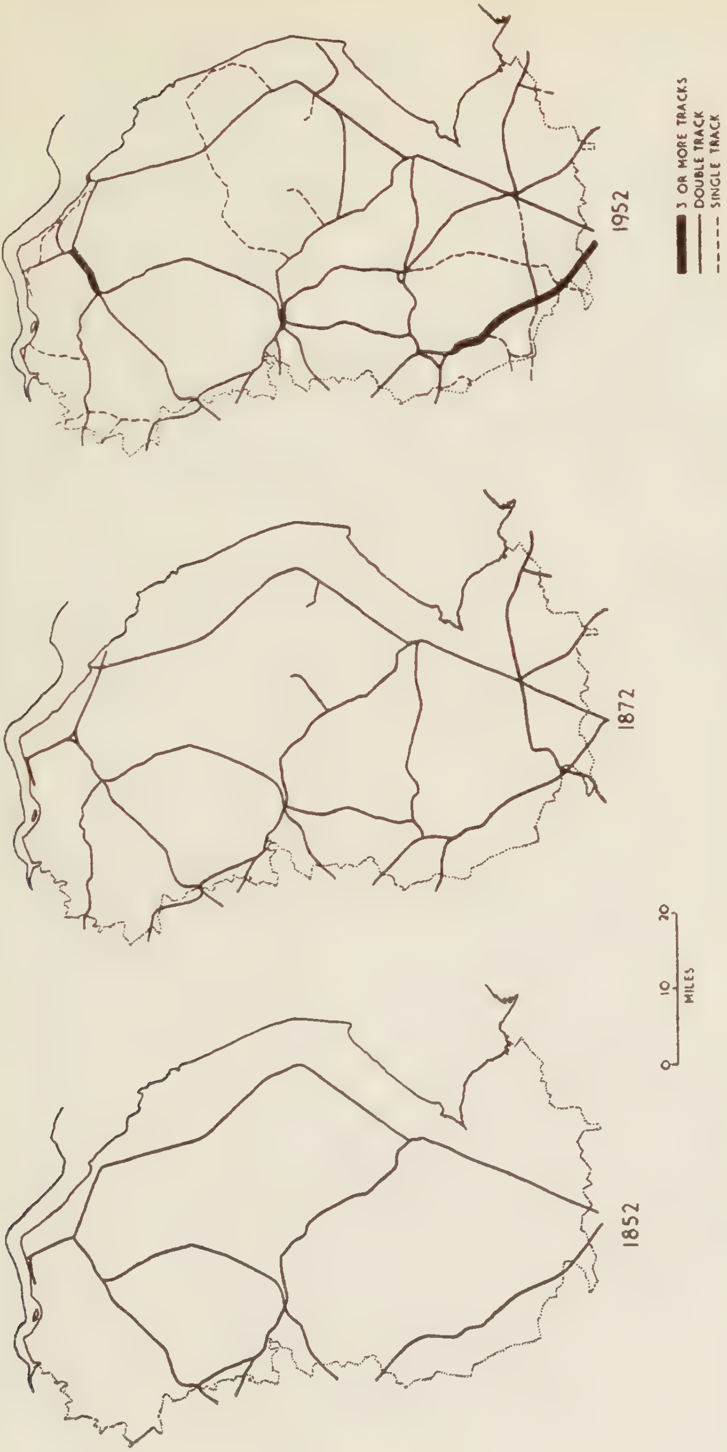

Fig. 6.—Lincolnshire : Railways.

exhibiting extremely slight fluctuations in population during the past half-century :—

	Population in thousands				
	1901	1911	1921	1931	1951
Market Rasen	2·2	2·3	2·1	2·0	2·1
Alford	2·5	2·4	2·2	2·2	2·2
Horncastle	4·0	3·9	3·4	3·5	3·8
Barton-on-Humber	5·7	6·7	6·5	6·3	6·2
Louth	9·5	9·8	9·5	9·7	11·0
Gainsborough	17·7	20·6	19·7	18·7	17·5

Among these examples Gainsborough is primarily an industrial town, which accounts for its higher population total. Its failure to expand is due more to industrial misfortunes than to its decline as a market centre, for too great a reliance upon a single large engineering firm has not only restricted the opportunities for employment, thus creating a more or less chronic exodus of young people, but has resulted in severe periodic unemployment. Increased diversification of industrial activity in recent years however, should give the town greater economic stability.

The areas of greatest increase lie around the margins of the county especially in the west between Lincoln (excluding the city) and the Humber, and in the east along the coast. In a number of these areas the increase exceeds that of the national average, i.e., over 15 per cent., the chief being the Scunthorpe district and the hitherto rural parishes surrounding the towns of Lincoln, Grimsby and Cleethorpes, together with the coastal districts of Skegness, Mablethorpe, Somercotes and Tetney.

In the first-mentioned cases modern industrial expansion, often receiving a new impetus during the war (to meet war-time needs) or afterwards (post-war full employment policy), provides the chief explanation. While Lincoln, Grimsby and Cleethorpes continued to grow during the period under review, like many large centres, they did so at a diminishing rate. On the other hand, outward movement from them, reflecting the attraction of pleasanter conditions in the country, led to a substantial rise in the population of adjacent rural areas. In the case of the coastal districts it is to their increasing popularity as holiday resorts and their attraction as residential centres for retired people, that the rise in population is mainly due.

The outstanding instance of population increase is of course the Scunthorpe district where the growth of the steel industry, accelerated by periods of swift expansion during the two world wars, has brought spectacular changes to the settlement pattern of the area. These include firstly, the building up of the town itself, largely by a process of rapid accretion around the five villages and hamlets which formed its early nuclei; and secondly, by the expansion of neighbouring villages such as Winterton, Broughton, Burton-upon-Stather, etc. which serve mainly as dormitory centres. The concentration of a large population upon this district has been effected by migration both from contiguous rural areas and from distant places outside Lincolnshire,

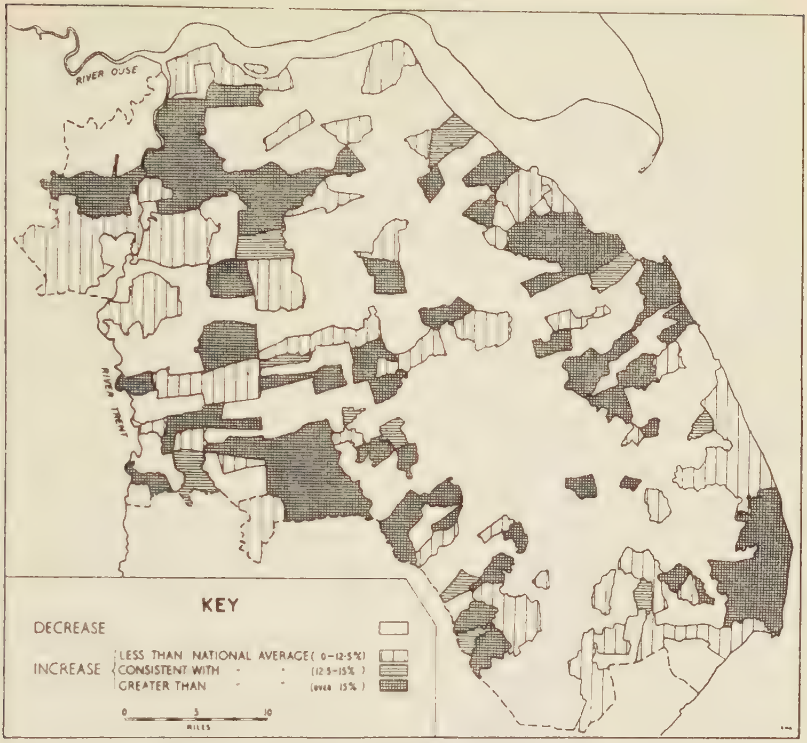
RIVER OUSE
RIVER TRENT
KEY
DECREASE
INCREASE
LESS THAN NATIONAL AVERAGE (0–12·5%)
CONSISTENT WITH " " (12·5–15%)
GREATER THAN " " (over 15%)
0
5
10
MILES

Fig. 7.—Lindsey : Population Changes, 1921–1949.

as well as by the relatively high rate of natural increase consequent upon the attraction to the steel works of large numbers of employees in the lower age-groups. The population of Scunthorpe in 1921 was 27.000 and in 1938, the year in which it attained to the status of a municipal borough, it was 35,000 ; to-day it is 54,000. Its growth, as Fig. 7 shows, has been accompanied by a substantial rise in the population of the adjoining Rural Districts of Brigg, Gainsborough and the Isle of Axholme. Owing to inadequate housing facilities there is still an extensive daily movement of workers into the town, the volume and direction of which is shown in Fig. 8[5].

Looking at Fig. 7 as a whole, it is apparent that certain areas of population increase tend to follow important lines of communication between east and west, which thus serve as avenues connecting the main zones of increase, the western and coastal. It is true that the shape of several of the parishes conveys an exaggerated impression of this trend but the tendency exists nevertheless and it would appear that current demographic changes add emphasis to the new pattern in the human development of the county.

In Lincolnshire the changes in geographical distributions arising from new forms of economic activity, especially those promoted by modern technical advances, must be set against the traditional background of agriculture. How, we may ask, has agriculture fared during the progress of such changes? Without doubt parallel advances in farming methods have resulted in a general increase in production but it is difficult to obtain an up-to-date measure of the changing proportions of the agricultural and non-agricultural population. Census returns show that in Lindsey during the period 1921–31 there was a decline of 6 per cent. among those employed on the land compared with an increase of 10 per cent. in those engaged in non-agricultural pursuits. In fact both Lindsey and Kesteven experienced a decline in agricultural employment, this reduction being particularly marked when expressed in terms of male land workers per 1,000 males occupied (Lindsey 197 and Kesteven 331 in 1921; 182 and 305 in 1931) and there are good reasons for believing that this trend has continued till the present time.

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[5] Based on information supplied by the County Planning Officer.

In the Holland division however, during the same decade, there was an increase in the numbers engaged on the land, the only instance of its kind among English counties. Composed largely of rich fenland, Holland continues to be of increasing importance for intensive cash-crop farming, steadily absorbing more labour, both male and female, and exhibiting little or no evidence of rural decay. Instead of shrinking villages and derelict farms, there are many examples of expanding agricultural settlements which, by their form and types of building have more than a touch of urban appearance. Quite typical is the ribbon-development of farm-workers' homes, consisting of a succession of neat bungalows and semi-detached villas to which the morning milk is delivered by a roundsman from a town dairy! Here therefore, the pattern of settlement, though not changing, shows intensification. Boston, the principal market centre, has benefited like some of the other small towns in Holland, from industries concerned with the processing of agricultural produce, and has shown a steady increase in population in recent decades: 16,102 in 1921, 22,109 in 1931 and 24,453 in 1951.

In Fig. 9 an attempt is made to summarise on a map the areas of Lincolnshire in which significant economic changes have recently been taking shape. In the north is a zone extending from south Yorkshire across the lower Trent through Scunthorpe to Grimsby in which industrial expansion is accompanied by a marked increase in population. This may well be termed the industrial axis of north Lincolnshire. The continuing industrial development of Lincoln, now more diversified than formerly, makes the city and its surrounding district an area of steadily increasing population. The coastal districts of Skegness and Mablethorpe, together with smaller centres adjoining them, are yearly becoming more important as resorts, while accompanying that development is a comparatively rapid increase in their permanent populations. Finally, throughout the fenlands, the commercialisation of agriculture has largely been the means of increasing the prosperity of a region which ranks among the most productive

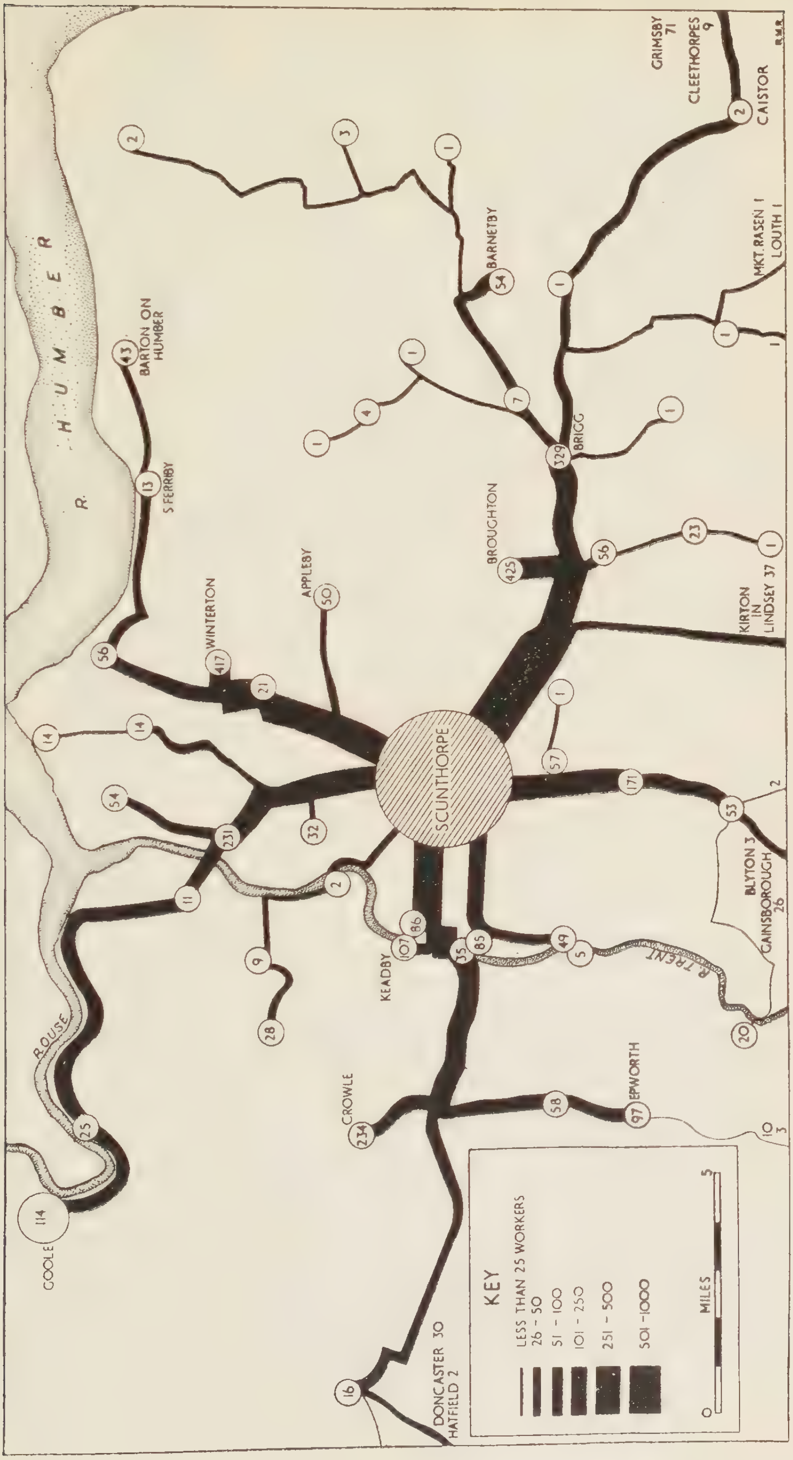

Fig. 8.—Scunthorpe: Daily movement of workers, 1949.

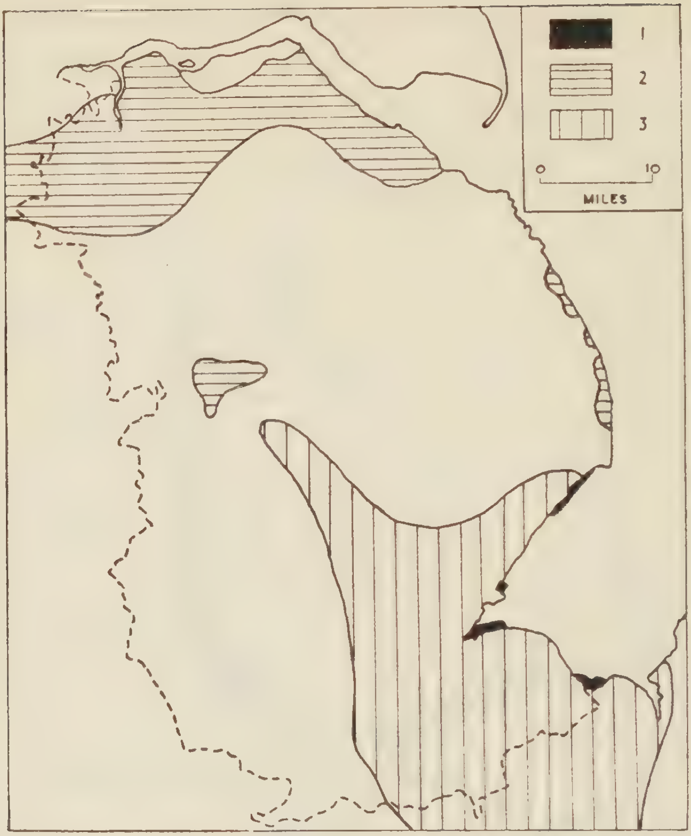

Fig. 9.—Lincolnshire : Areas of economic change.
1. Land newly reclaimed for agriculture. 2. Areas of industrial development with accompanying increase of population. 3. Area of increased commercialisation of agriculture (intensive cash crop production).

in the country. The success of the newly reclaimed areas around the margin of the Wash, worked skilfully by farmers whose co-operative efforts were largely responsible for bringing them into existence, is perhaps indicative of the continued expansion in agriculture of which the fens are still capable.

This brief survey, which demonstrates the emergence of directions of development alongside the traditional patterns in the human geography of Lincolnshire, shows that from the economic standpoint, functional areas within the county are becoming more sharply differentiated. With the improvement in communications, particularly as far as roads and motor transport are concerned, it is also clear that in recent years Lincolnshire has been brought more closely into contact with the main industrial and commercial framework of the country as a whole, thus reducing the relative isolation which was for long a handicap.

BALANCE IN GEOGRAPHY AND EDUCATION

R. C. HONEYBONE*

THE theme of this paper is not a new one, for the problem of internal balance in geography has been before us in this country, ever since Mackinder argued the case for a unified geography in his famous address to the Royal Geographical Society in 1887. The words that he spoke then have a curiously contemporary ring. " One of the greatest of all gaps," he said, " lies between the natural sciences and the study of humanity. It is the duty of the geographer to build one bridge over an abyss which in the opinion of many is upsetting the equilibrium of our culture. Lop off either limb of geography and you maim it in its noblest part " ;[1] and later, "As a subject of education, however, and as a basis of all fruitful specialism within the subject, we insist on the teaching and the grasping of geography as a whole."

Despite this insistence, however, it was still true in 1901, that " for want of observance of this principle, there may still be seen on some timetables lessons quite disconnected under the heads, Geography and Physical Geography " ;[2] and it was still necessary for Professor Wooldridge in his paper to the Geographical Association only five years ago, to emphasise the serious lack of attention in schools to the physical basis of our subject.[3]

The question of internal balance in geography is, therefore, one which has been with us for a very long time ; and indeed, is one which must, of necessity, be always with us. A discipline which recruits its students from the sciences and the humanities alike, has continually to keep its synthesis under review, as Mackinder insists, both " as a subject of education . . . and as a basis of all fruitful specialism within the subject." Every teacher of geography, whatever his approach to the subject, must not allow his particular interest or, possibly, lack of interest, to distort his teaching. If his pupils are not led to an understanding of the value of the geographical synthesis, then he is failing in his full task. His own lack of balance has been transmitted to his pupils.

The teacher's task is, however, made more complex by the fact that he must project his geographical synthesis into an educational synthesis; or in other words, that he must not only achieve a balance in his geographical thinking, but must also achieve a proper balance between his subject and the total educational needs of the children whom he teaches. There is nothing new in this statement, but nevertheless, many teachers have found it difficult to achieve this balanced outlook in geography in particular, and in education in general.

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* Mr. Honeybone is Head of the Department of Geography in the Institute of Education, University of London. The paper published here was given by him at the Annual Conference of the Geographical Association, in London, on December 31st, 1953.

[1] H. J. Mackinder. " On the Scope and Methods of Geography," *Proc. Royal Geographical Society*, vol. ix, 1887, p.145.

[2] T. G. Rooper. " Methods of Teaching Geography," *Geographical Teacher*, vol. i, 1901, p.6.

[3] S. W. Wooldridge. " On taking the ' Ge-' out of Geography," *Geography*, vol. xxxiv, 1949, pp.9–18.

We stand now at the beginning of an era, potentially more fruitful for the teaching of geography in school than any that has gone before; and it is helpful to look back over some of the extremes to which geographers have strayed during the last twenty to thirty years, so that we may be better prepared to take advantage of the opportunities of the present day.

Many members of the Geographical Association will remember the accounts given last May of the conditions in the Department of Geography of University College, London, during the nineteen twenties.[4] Field work was unknown, large scale maps practically non-existent, and the facilities for research severely limited. I am not suggesting that the calibre of the undergraduates was lower than it is now ; far from it, for some of the early graduates of this department are now numbered among our leading geographers. But I do suggest that these earlier students went down from their universities with less experience of the philosophy of their subject, and with less practical knowledge of field work and map interpretation than their post-war successors.

These conditions were not, of course, confined to University College, London, and I venture to suggest that if pre-war graduates were to compare their own undergraduate training with that of their post-war successors, most of them would fully realise their own early inadequacies. Many, and I include myself among them, were woefully ignorant of the real meaning of the physical basis of geography. Those who became teachers not unnaturally reflected this weakness in their teaching.

Ironically enough, they were to some extent fortified in their lack of geographical balance, by the widespread influence of the late James Fairgrieve. Those who worked under him, of course, were brought to a full understanding of the geographical synthesis ; they knew of his approach to geography through his beloved Scottish hills ; and they understood his oft repeated phrase that the best way to learn geography was " through the soles of one's boots." But those who merely read his famous dictum on the function of geography in school with superficial understanding, imagined that here was the educational justification of their lopsided teaching. Fairgrieve asserted that " The function of geography in school is to train future citizens to imagine accurately the conditions of the great world stage and so help them to think sanely about political and social problems in the world around ".[5] Many teachers, however, forgot the " great world stage," so that geography came more and more to be a " world citizenship " subject, with the citizens detached from their physical environment.

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[4] Celebrations, held on May 16th, 1953, to mark the jubilee of the foundation of the Department.

[5] James Fairgrieve. *Geography in School,* first edition, London, 1926, p.18.

During the thirties, too, partly under American influence, a methodology, proclaiming that all education must be related to the everyday experience of children, received a tremendous impetus. Taken to extremes, as educational ideas so frequently are, adherents of this methodology wished to sweep away much that was traditional and useful in our education. In terms of geography, they insisted that the approach must always be through the life and work of men. This is a premise with which many teachers of geography will agree, but when put in the hands of people untrained in geography or trained without a proper sense of geographical synthesis, it frequently meant that geography in school started with the life and work of man, and made no real attempt to examine his physical environment. In other words by 1939 geography had become grievously out of balance ; the geographical synthesis had been abandoned ; and the unique educational value of the subject lost in a flurry of social and economic generalisations.

While this development was occurring in Britain, an opposite course was being pursued in Germany. There, the universities had always had a greater physical bias than in this country ; and, due to the relatively recent unification of the country in 1871, considerable emphasis was laid on the development of a feeling for the Fatherland, while, at the same time, allowing a great deal of importance to local regional differences, which in Germany had always been of greater significance than in Britain. There thus developed in the schools an over-emphasis on the physical basis, on local geography and field work, and on national geography with a corresponding under-emphasis on the geography of other lands ; and it was usual, until very recently, for German children to go to school at the age of six and not to learn the geography of any area outside Germany and its immediate neighbours until they were thirteen. In the inter-war period, too, the teaching of geography in Germany was used as a means of keeping alive a hatred of the Treaty of Versailles ; and references to " our lost lands " and " our lost colonies " were common in the school textbooks.

Thus while geography in England was assuming a more social, economic and international flavour, in Germany it had a strong physical and nationalistic character ; so that we have the curious position that, in the lands which had given rise to Humboldt and Ritter, and to Mackinder and Herbertson, the geographical pendulum had swung to opposite extremes. It is possible for each country to learn from the other's experience ; in Britain we need more field work, physical basis and national geography, and in Germany the need is for greater emphasis on the geography of other lands. And it is no matter for surprise that in Germany, at the end of the war, geography was reduced to one teaching period a week, and that, in England, geography was assailed by a new " activity " called Social Studies.

In Britain, some people suddenly discovered the virtues of local survey, long advocated, but not sufficiently practised by geographers. They also suddenly discovered the virtues of integration, again inherent in the geographical synthesis, but frequently overlooked in school.

If geography had been widely taught in such a way that its value, both as a subject in particular and as a medium for education in general, had been clearly apparent, it is possible that these people would have turned to the geographer for co-operation. Unfortunately, the extremists among them, flushed by their own enthusiasm, could see only the worst features of geography. They were willing to throw overboard the experience of years; they wanted to discard one synthesis in the search for another; geography and history were to be swept away as separate subjects; the specialist teacher was regarded as old-fashioned; projects and freer methods generally were to replace class teaching; and the emphasis was to be on method rather than on matter, so that, in the words of the cynic, "It didn't matter if the children did nothing, as long as they were kept busy doing it."

These extremists, usually very vocal, have done a great deal of harm to the prestige of more sober educational thinkers, and also to their own cause. There is, of course, a great deal of value in projects and freer methods generally; there is a great deal of value in integration at the proper time and place; but there is also a great deal of value in class teaching; and a great deal of value in subjects well taught by the appropriate specialists. If these extremists had been people of better balanced outlook and more experience of life, they would have been willing to try to use the good things of the present and past as an aid to improving the future. They would have realised, too, that their own extremism would inevitably produce a strong reaction; and this has, in fact, happened in two ways. In the first place, the teaching profession with its sober good sense, has been very slow to adopt these ideas completely. Most teachers have continued to lay a good deal of stress on the importance of matter. It may be, as I shall suggest later, that their stress on matter at the expense of method, has been too strong; but at least they have not gone to extremes. Projects are beginning to take a more balanced place in the teaching programme, and my friends in the publishing world tell me that the interest in Social Studies has dropped very markedly.

The other type of reaction against the extremists is represented by the pamphlet on Social Studies issued in 1950 by the Royal Geographical Society.[6] I know that I am on thin ice in such a company as this in criticising this document, but in some ways it has had a boomerang effect. It was a valiant document, and useful in proclaiming publicly that geographers were very critical of the new developments in Social Studies. Where it was not so useful was in its selection of the more extreme manifestations of Social Studies as objects of criticism. We may complain that the N.U.T. report on the curriculum mentions the advances of geography,[7] and then proceeds to ignore them by basing its recommendations on the worst features of geography teaching; but have we not in this pamphlet exposed ourselves to a similar charge? I must add in passing, however, that I have every sympathy for the members of the committee which prepared the pamphlet, for it must have been one of the hardest tasks of post-war education to find out what is meant by Social Studies and what its content is.

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[6] Royal Geographical Society. "Geography and Social Studies in Schools," *Geographical Journal*, vol. cxvi, pp.221–224.

Discussion of the Royal Geographical Society's pamphlet is, however, quite subsidiary to the central theme of this paper, but it does serve to emphasise my point that in education, as in the wider walks of life, the pendulum does swing from one extreme to the other. Social Studies, interpreted as a substitute for history and geography, represents one extreme; the R.G.S. pamphlet represents a violent reaction. My own feeling is that we ought to examine Social Studies carefully to see if, beneath many of the extravagant claims of its advocates, there is something of educational value. It is not my intention to do this today, except to suggest that there seems to be developing a more sober approach, which, for want of a better name, I will call "a study of society." It may well be that towards the end of a modern or grammar school course, such an introduction would be a useful adjunct to the separate study of geography and history; but this is a topic that I do not intend to pursue now.

I do, however, suggest that just as it is important to examine the implications of Social Studies, it is equally important to examine the implications of our own teaching of geography. I am convinced that geography and history, well taught, can achieve all that is claimed for Social Studies, and a great deal more. I am old fashioned enough to believe that, other things being equal, the geographer can teach geography better than the non-geographer; and the historian can teach history better than the non-historian. If the teacher is a good one, the children will in no way suffer from specialist teaching. But the important words are *well taught.*

If the Social Studies controversy has no other effect than that of making us put our own house in order, then it will have made a very important contribution to the development of geography teaching in school. It is a pity that by reason of its brevity, the Royal Geographical Society's pamphlet could not develop the case for geography at greater length. We have a very strong and positive case; and as I have already suggested, the present time is particularly hopeful for a widespread advance in the teaching of geography in school.

In the universities, there has been an unparalleled advance in the number of staff and scope of the work in the departments of geography. In the University of London alone, there are now six chairs, four of them of relatively recent creation. Students, both graduates and undergraduates, are greater in number than ever before. Many of the training colleges and university departments of education are taking a full part in this progress ; employers are realising the value of the breadth of a university training in geography ; and the Civil Service has recently raised the status of geography in its higher examinations. In fact, on all sides, we can see signs that, at long last, geography is forcing its complete acceptance as a major discipline in the universities, and that geographers are welcomed into commerce, industry and the professions, because they are well educated men and women ; and perhaps, most significant of all, a wider public is beginning to read books written by geographers.

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[7] National Union of Teachers. *The Curriculum of the Secondary School,* London, 1952.

But what of the schools ? Are they in turn taking an active part in this great advance ? Or are they standing by passively, waiting for the ferment in the universities to trickle slowly down to them, like the lukewarm drips of a leaking hot-water tap ?

It is true that the statistics of the university examining bodies show that geography, both at Advanced and Ordinary levels in the General Certificate of Education, is relatively more popular than ever before. But can we face our critics and honestly say that the water-tight barriers between subjects, of which they complain, are not of our making ? Can we with good faith, stoutly assert, that we do in fact, lead our pupils towards the geographical synthesis, of which we talk so much ?

The N.U.T. report on the curriculum published last year, states " the study of geography has often become overburdened with data meaningless to the pupil."[8] It is illuminating to compare this criticism with one taken from the first volume of the *Geographical Teacher* in 1901. " In British schools, Geography has ever been a dull and uninteresting subject. It has been a dreary recitation of names and statistics, of no interest to the learner, and of little use except, perhaps, in the sorting department of the Post Office " ;[9] and to compare this with Mackinder's words in 1887 : " When, however, the method of description has been adopted, and still more that of enumeration, each additional fact adds an ever-increasing amount to the burden to be borne by the memory. It is like throwing another pebble on to a heap of gravel." [10]

Are we to believe from these quotations that we have made no progress since the end of last century ? That is far from the truth, and the important fact to note is that the quotations of 1887 and 1901 were apparently of general relevance, while the quotation of 1952 is not. Even the N.U.T. report recognises that progress has been made, although it unfortunately ignores it in its recommendations.

General improvement has, however, been disappointingly slow in some respects, and I often wonder what the contributors to the first volume of the *Geographical Teacher* would think of the position today. There is a tremendous amount of geographical and educational wisdom in this and the other early volumes. There are articles on methods in general, on the use of pictures and Ordnance Survey maps, and the value of field work.[11] These are all equally topical at the present moment, and it is worth stressing that the present emphasis on these topics cannot, therefore, be dismissed as a mere passing fashion. It is true that the teaching of geography has been completely revolutionised in this century, but I suggest that much of the early advice was unheeded mainly because the writers were before their time. Just as the effect of the work of Humboldt and Ritter in regional geography in the mid-nineteenth century was limited by the lack of knowledge of the regions of the world, so the effect of these early suggestions on the teaching of geography was limited because most teachers had neither the knowledge nor the experience necessary to carry them out.

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[8] National Union of Teachers, *op. cit.*, p.52.
[9] T. G. Rooper, *op. cit.*, p. 4.
[10] H. J. Mackinder, *op. cit.*, p.144.

Now, however, we have far more teachers with the knowledge and experience to take advantage of this advice, and that is why I suggest that we are standing on the threshhold of a great advance in the teaching of geography. But we cannot advance very far unless we rid ourselves of the one factor which has remained persistently with us in the centre of the field, regardless of the extremes to which the rest of geography and education have swung.

As is so frequently the case, Mackinder sums up this problem for us in the words " Can geography be rendered a discipline instead of a mere body of information ? "; [12] or, in other words, can we put more emphasis on understanding than on memory ? If we analyse the trends of geography teaching during this century, it appears that, although the type of memorisation has changed, yet memory has always been very markedly the senior partner in the uneasy alliance of memory and understanding. At one time, there existed the much derided " capes and bays "; at another, what we might call " economic capes and bays," lists of products related in the flimsiest way to their environments ; at another, the " pseudo scientific capes and bays," the era of the isobars and the planetary wind system ; and at the present time, we seem to be over emphasising the " regional account capes and bays." The last, of course, represents a great advance over the first, but do not let us delude ourselves that a regional account, under the headings of Position, Relief, Climate, Natural Vegetation, Occupations, etc., necessarily represents a true geographical synthesis. Frequently, such regional accounts in school are mere feats of memory, with little or no relationship between the various parts.

Regional geography, in my view, is the very heart of geography, the central core, which more than any other feature, gives the subject its unique character. I have noted, with some concern, that there has been a recent tendency to move away from the regional approach to teaching. Although the so-called concentric approach has certain obvious attractions, and can, to some extent, be wedded to the regional concept, I cannot help feeling that its development is unfortunate for geography, both as a discipline and as a medium for education; and there is no doubt that this recent movement has derived its impetus in part from dissatisfaction with the stereotyped and debased form of regional geography so often found in schools.

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[11] Bibliographic reference to these is made in *Local Studies*, revised edition 1949, p.63, which is published by and is obtainable from the Geographical Association.

[12] H. J. Mackinder, *op. cit.*, p. 142.

The clue to an improvement can be found, as so often it can be found, if we turn again with a critical eye, to the development and methods of our subject. At the turn of the century in France, there was working a group of geographers under the inspired leadership of Vidal de la Blache. They went out, notebook in hand, and observed carefully, and recorded by annotated sketch-map and diagram, the nature of the landscape both physical and cultural. Back in the map room and library, they endeavoured to interpret their observations, so that finally they were able to enter into the personality or character of the region. Many of you will be familiar with their masterly regional analyses. Not for them the barren headings of Position, Relief and Climate. They regarded their regional accounts as regional symphonies, in which all the facets of the landscape were blended as are the strings, brass and woodwind of a great orchestra, creating in harmony an effect much greater than the simple sum of the instruments.

This threefold process of observation, recording and interpretation is the basis of all geographical method, and the essential forerunner to the final, and necessary, stage of generalisation. It has been the major curse of geography in school, that the stage of generalisation has too frequently been placed first, and the preceding three stages omitted.

It may be helpful, therefore, if we consider the methods of the French geographers in terms of our teaching in school. Instead of adopting a stereotyped approach to every region, we might, for example, first select a personality or theme, and then weave our regional account round this central idea. Furthermore, we should remember that the French geographers began, where all geographical work must begin, in the field. Clearly, in school, we cannot study very much geography at first hand, and we have, therefore, to approximate our classroom conditions as closely as possible to those of the field. The chief problem before the geography teacher then is to select material which his pupils can study in order to discover, as the French geographers did, the personality of a region. This material may take the form of maps, pictures, vivid descriptions, statistics, models and so on, arranged around the central theme.

An example will help to make this approach clearer. Let us suppose that we have a lesson on the Pennines with fourteen-year old children. If they are from a large town in the South of England, we may wish to convey to them a sense of the bareness, the loneliness and the beauty of these northern hills. We can present to them a one inch or a two and a half inch Ordnance Survey map, and two or three pictures, and we can guide them by question and answer, written and oral, to a discovery and understanding of the character of the Pennines.

This approach has many merits; for not only is the matter geographical, but the method is geographical. Matter and method are wedded, and not divorced, as is so often the case. The children are experiencing in the classroom some of the stimulus of field work ; they are being made to think for themselves ; and any facts which need to be memorised emerge as facts that have relational significance and not as unconnected snippets of information. Moreover, this approach is one of infinite variety and is one that can be used with children of wide age and intelligence ranges in primary, modern and grammar schools. It will, I suggest, successfully withstand the closest critical review both on geographical and educational grounds.

Time precludes any further examples, but it is important to add that this method, which already is in use in some schools, is showing signs of considerable expansion. It is a perfectly practical classroom approach, maintaining a balance between the elements of geography in particular and of education in general ; but it is, of course, much more demanding of the teacher than some more traditional methods.

Two points need to be noted briefly. The first concerns the supply of the data, such as maps and pictures, which are needed as geographical raw material. Ordnance Survey maps are expensive, but the sets published by the Geographical Association are cheap and of very great value ; and the Ordnance Survey offers spare copies of examination map extracts at very low rates. Some schools were fortunate enough to secure copies of the G.S.G.S. foreign maps, but it would fill a very great need if the Geographical Association would publish a series of foreign map extracts on the lines of its Ordnance Survey sets. Good teaching pictures, too, are available in packets and in film strips as never before. In other words, on the material side, the opportunities exist, even in these days of financial stringency.

The second point concerns the time available for teaching. Many teachers may tend to dismiss this approach because they think that it takes longer than other methods ; but I suggest that it is relevant to argue that time taken can only be judged against the results achieved, and I am convinced that children who cover less ground, but cover it more thoroughly and with more geographical understanding, are better educated persons than those who cover every region of the world more superficially, and frequently with a monotonously stereotyped approach.

I have long come to the conclusion that every teacher of geography must sit back and think carefully over his syllabus to decide what he can cut out in order to give more time to certain areas which seem to him to be particularly significant in his pupil's total geographical education. This throws a great responsibility on to the teacher, but in this country, he enjoys more freedom than in any other country. The priceless privilege of freedom entails responsibility, and it is in cases like this that the teacher must fall back on his own balanced judgment.

Many teachers whose pupils sit for external examinations, however, may well ask " But how can I afford to leave out parts of the syllabus ?" This is, of course, a very natural question, but I repeat that this ' field study ' approach is applicable equally to grammar and modern schools ; and I can assure grammar school teachers that the candidates who are able to apply their knowledge achieve better results than those who often have more knowledge but less understanding. Schools which train their candidates entirely on a ' spot the question ' basis not infrequently crash badly. Sets of notes, learnt parrot wise and reproduced in a fashion varying from good to bad, are frequently offered, even if they have very little connection with the question set. I well remember one of my assistant examiners, after marking one particularly exasperating set of scripts, asking me to include in the next rubric, the statement " Candidates are advised to read the questions before answering them."

Teachers, I am quite sure, would be well advised to cover less ground in a more thorough way, and to say plainly to their candidates " Here is a list of topics that I shall not cover. You must prepare them yourselves." This is not a lack of conscientiousness, but plain common sense, and in practice pays handsome dividends from all points of view.

Examiners, both internal and external, on the other hand, can themselves help by setting more imaginative papers. Many of the questions of today still have a rather too close resemblance to some of the examination papers contained in the appendices to Scott Keltie's famous report to the Royal Geographical Society in 1886.[13] A typical example selected from Scott Keltie's collection runs as follows: " Where are the following rivers? Into what sea do they flow? (Name) Any one town on any of them ; any historical fact in connection with any of them ;—Tarim, Lot, Wharfe, Lualaba, Pisuerga, Mekong, Armançon, Bagradas, Canadian River, etc., etc." But my favourite is the one that begins " Draw a Chinaman, the Great Bear, and a yak."

It would be salutary for teachers and external examiners alike to read an article by F. J. Wilkinson in the *Geographical Teacher* for 1901. " The examiner," he writes, " who fills his paper with ' Memory ' questions debases the subject, encourages cram and discourages thought. The examiner who relies on ' Rational ' questions treats the subject worthily . . ." Mr. Wilkinson then goes on to analyse several examination papers, and of the Oxford Senior in 1900, he complains that " Amidst a dreary mass of ' Memory ' questions (73 per cent.), we only find a faint glimmer of the ' Rational ' method (16 per cent.), with one physical question (11 per cent.)."[14] Apparently in those days ' physical ' fell into neither of the groups ' Rational ' or ' Memory.'

I do not propose to submit modern examination papers to such an analysis now, but I would suggest that examiners have in their power an instrument for good or ill. They, too, have their responsibilities, as well as the teachers. If they set more and more ' Rational ' questions, teachers and pupils alike will naturally adjust the emphasis of their work to meet the need for greater understanding, and thereby achieve a better balance.

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[13] J. Scott Keltie. " Report to the Council of the Royal Geographical Society." *R.G.S.* Supplementary Papers, vol. 1, 1882–85, pp.439–594.

[14] F. J. Wilkinson. " Recent Examination Papers in Geography," *Geographical Teacher*, vol. i, 1901, pp.39 and 42.

In this paper, it has been suggested that geography in schools has not always maintained a balanced outlook ; that some educational theories have been taken to extremes ; and that the teacher, in order to restore the balance, must re-examine both the nature of geography and the nature of his job as an educator. I have suggested an approach in which method and matter are welded in a way that should satisfy geographer and educator alike ; and I have suggested that, by reason of the improved status of geography in the universities, training colleges and the country in general, and the greater number of students and teachers well acquainted with the philosophy of their subject, we are now in a position to make a balanced and general progress in a way that was impossible for our predecessors. This progress can best be achieved if we refuse to go to extremes in either matter or method, and in either subject or child. We are fortunate that both the matter of our subject and its methods are completely in line with modern educational requirements; much of our work comes within the direct experience of our pupils, and most of it is closely relevant to their development both as individuals and as members of society ; our approach is integrated and our methods are 'active,' in that they throw the responsibility for learning on the children. So let us, in our teaching, emphasise the things that are geographical ; and, of the things that are geographical, I would rate very highly for greater emphasis in schools :—field work for all age groups, including some local survey every year ;[15] the 'field work' approach in the classroom ; a regional 'grammar,' with a proper synthesis of physical and cultural elements ; a physical basis that means the understanding of scenery and simple meteorology, and not a string of unconnected and generalised abstractions ; the geography of Britain, including some Ordnance Survey map and picture interpretation every year ; the sketch map as the geographer's 'shorthand,' and not as a reproduction of the atlas or textbook map, thrown into an examination script as a supposed sop to the examiner ; and, above all, understanding as well as memory. If we emphasise these things, we shall achieve a better geographical balance by insisting as Mackinder said, on 'the teaching and grasping of geography as a whole.'

But let us not, in our enthusiasm for our subject, forget that there are other fields of knowledge and other methods ; or that, where geography abuts on to other subjects, we should take every opportunity to ensure that there is active collaboration by the other members of the school staff. This 'middle of the road' course that I have advocated is not a spectacular one ; it will not satisfy those who seem to chase educational ideas to extremes ; but if it assists us to maintain a proper sense of balance in geography and education, then it may well be that this Diamond Jubilee year of the Geographical Association will mark the beginning of a new era in the teaching of geography in school.

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[15] R. C. Honeybone. "Field Studies," National Froebel Foundation *Bulletin*, No. 84, 1953, pp. 1–10.

THE GROWTH AND DEVELOPMENT OF THE SOUTH AFRICAN CITRUS INDUSTRY

Monica M. Cole*

IT is probable that citrus fruit was introduced into East Africa by Arab traders from Media, Persia and possibly also India earlier than the first century and we know that Vasco da Gama took on supplies of oranges when he called at Malindi and Mombasa during his historic voyage from Portugal to the East Indies via the Cape of Good Hope. Following the discovery of this route the ships of the Dutch East India Company used St. Helena as a victualling station. Citrus trees were introduced and less than a century later orange, lemon and citron trees were growing luxuriantly on the island. In 1652 the first European settlers under Jan van Riebeeck were sent out to the Cape by the Dutch East India Company to build a fort and lay out a garden to provide supplies of fruit and vegetables for the ships *en route* to and from the Indies. The first orange trees were brought from St. Helena in 1654 ; they flourished and bore fruit seven years later, by which time over one thousand trees had been established. This marks the beginning of the citrus industry in South Africa.

However, citrus fruit growing remained on a small scale until the beginning of the present century. It is known that some of the early settlers planted individual orange and naartjie[1] trees in the eastern Cape Province and Natal at the beginning of the nineteenth century and that shortly after the Great Trek trees were propagated from seed in the western Transvaal. The early plantings were either of seedlings or of trees propagated from "layers." It was not until 1850 that the first budded trees—Bahia navels, unfortunately of inferior quality—were imported from Brazil by a Uitenhage farmer.[2] Four years later Bahia navel trees, grafted by a Grahamstown farmer, were distributed in the Cape Province, and since commercial citriculture is based primarily on trees propagated vegetatively, this may be regarded as the beginning of the second stage in the development of the industry in South Africa. The influence of the early plantings lingered, however,

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The field work connected with this study was carried out between 1947 and 1951 and the author wishes to thank the citrus farmers and the officers of the Department of Agriculture for their co-operation in the provision of information and statistics. The analyses of the climatic conditions were made from the records held in the Meteorological Office, Pretoria, by kind permission of the Director.

[1] A naartjie is a large tangerine.

[2] This was 23 years before the first two trees were imported from Brazil to California and were destined to give the world's most widely distributed orange, the Washington Navel. Uitenhage is about 20 miles inland from Port Elizabeth.

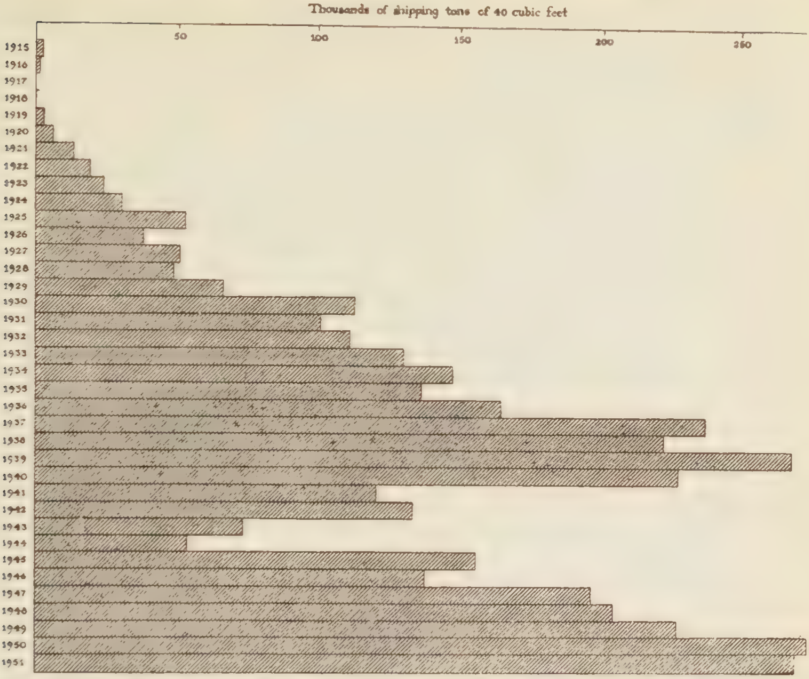

Fig. 1.—Yearly exports of citrus fruit from the Union of South Africa. Prepared from data published in the reports on the Citrus Export Seasons for each year from 1927 to 1939, and 1946 and in volumes of *Farming in South Africa* for 1947 onwards.

as may be seen from Fig. 3, seedling oranges still furnishing a considerable percentage of the exports from the western Transvaal.

The large-scale commercial development of the citrus industry in South Africa dates from 1895 when Cecil Rhodes brought in trained horticulturists, mainly from California, to develop the fruit industry in the Cape. Progress was slow until after the end of the 1914–18 war. However, in 1906 South African fruit was exhibited at the show of the Royal Horticultural Society in London and aroused considerable interest. Following Union the railways introduced flat rates per ton of fruit despatched to any port and in 1912 favourable sea freights were negotiated with the Union-Castle Line. The way was therefore opened up for development in the interior, while the opportunities for export to the United Kingdom during the northern summer appeared good. The post-war years witnessed a period of expansion. In 1920 alone over half a million trees, mainly Valencia Late orange, were planted and large plantings continued until 1930. A large proportion of this increase was due to the activities of a few large companies, mainly in the northern and eastern Transvaal, where they still exert a big influence on the industry. Then came the depression and increasing competition from Brazil, California and Spain, encroaching on the summer market in Europe. From 1930 onwards, when the large plantings made during the 1920–25 period came into bearing, the number of citrus trees remained fairly constant until 1948. Exports however, increased steadily to a maximum in 1939, when over a quarter-million shipping tons were sent overseas, mainly to the United Kingdom. In fact the South African producer depended almost entirely on the English market and when the outbreak of war in 1939 severely restricted this, he found difficulty in disposing of his fruit. In order to help the growers, the Citrus Board was established in December, 1939, by the South African Government for the purpose of developing and controlling the marketing and distribution of the fruit. As soon as the war in Europe ended, the United Kingdom was anxious to import citrus fruit and she turned to South Africa to supply the need. Exports increased and there followed another period of extensive planting which is still continuing. However, the average commercial life of an orange tree budded on a rough lemon rootstock (and almost 99 per cent. of the trees are budded in this way) is only 30 years and the present-day plantings are mainly necessary to replace the old orchards which are going out of production. The further expansion of the industry depends on the maintenance of the present rate of planting.

In South Africa citrus fruit is grown under more varied geographical conditions than in any other country, while there has been a marked shift in the main centre of production during the past 15 years. It is grown in several physiographic regions characterised by differing conditions of relief, climate and soil. The distribution of the trees is shown in Fig. 2. The concentration along the valleys of rivers draining to the Limpopo and Crocodile-Komati in the Transvaal and to the south-east coast in the Cape Province is marked. Less important areas occur along the Mooi river in Natal and the Olifants in the south-western Cape.

The altitude at which the orchards occur is everywhere below 4,000 ft. but varies from one physiographic region to another. In the western and northern Transvaal they occur in the Bushveld at just below this elevation, in the north-eastern and eastern Transvaal in the Lowveld at between 2,000 ft. and 3,000 ft. above sea level and in the foothill and mountain belt of Natal and the south-eastern Cape at altitudes varying from 100 ft. in the Sundays river valley to 2,000 ft. in the Kat river valley. At higher altitudes the danger of frost is the limiting factor in each region.

There are important differences in the climatic conditions from one area to another. The producing areas in the Cape are near the coast and feel the effect of maritime influences, while the Transvaal producing areas are located towards the interior of the land mass and are further cut off from oceanic influences by the Lebombo mountains (forming the boundary between the Union and Mozambique) and the Drakensberg. Annual and seasonal ranges of temperature and humidity are greater in the interior, while the seasonal occurrence of the rainfall is more marked there. During the winter months the temperatures rise to about 70° F. in the middle of the day and fall to about 40° F.

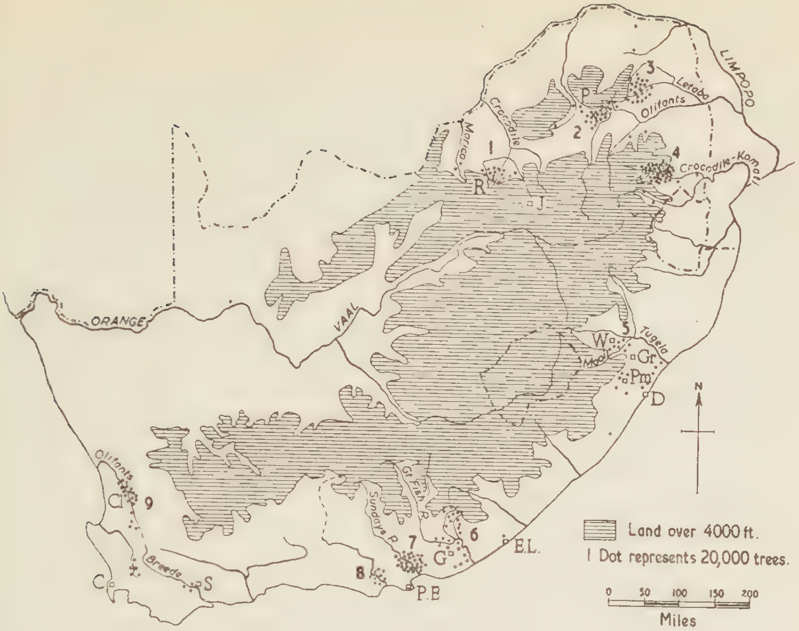

Fig. 2.—Citrus fruit producing areas.

Compiled from figures given in the 1949–50 agricultural census (given for magisterial districts only) and from informatio ncollected by the author between 1947 and 1951. Key.—1. Western Transvaal: Rustenburg—Koster—Marico. 2. Northern Transvaal: Potgietersrust and Zebediela. 3. North-eastern Transvaal: Duivelskloof—Tzaneen—Letaba. 4. Eastern Transvaal: Airlie—Karino—White River. 5. Natal: Muden and Golden Valley. 6. South-eastern Cape: Bathurst—Grahamstown and Fort Beaufort and Kat River Valley. 7. South-eastern Cape: Sundays River Valley. 8. South-eastern Cape: Gamtoos Valley. 9. South-western Cape: Clanwilliam and Olifants River Valley.

C—Capetown; Cl—Clanwilliam; D—Durban; E.L.—East London; G—Grahamstown; Gr—Greytown; J—Johannesburg; P—Potgietersrust; Pm—Pietermaritzburg; P.E.—Port Elizabeth; R—Rustenburg; S—Swellendam; W—Weenan.

at night in most regions, but the days and nights are somewhat warmer in the Lowveld and the nights are markedly cooler in the western Transvaal. In summer, maximum temperatures around 85° F. are usual, while nightly minima are in the vicinity of 60° F. However, the days are generally hotter in the western Transvaal, while the nights are warmer in the Lowveld. The highest temperatures usually occur in September or October before the rains, when maxima of over 100° F. may be expected in all regions. There is little danger of frost except in the western Transvaal, where low temperatures may be experienced in June and July. Generally speaking the temperatures are satisfactory for citrus fruit production, the greatest danger being excessively high temperatures combined with low atmospheric humidity, which may be experienced in the inland situations in early summer.

The amount and distribution of the rainfall also varies considerably from one producing area to another. It is lowest in the Sundays river valley where it averages between 10 and 20 inches per annum fairly evenly distributed throughout the year and highest in the north-eastern Transvaal, where between 30 and 40 inches are received;

here as elsewhere in the Transvaal and Natal it is concentrated in the summer months and the winter is a season of marked drought. The total fall in the western Transvaal and Natal is between 20 and 30 inches. In contrast to these areas the rainfall is concentrated in the winter half-year in the south-western Cape, the total amount varying from less than 10 inches in the Olifants valley to over 30 inches near Swellandam. The seasonal distribution of the rainfall and in some areas the inadequacy of the total makes irrigation essential for commercial citrus production in all the regions.

Generally speaking, climatic conditions are favourable for citrus fruit growing ; frost is a danger only in the Kat river valley ; in the Transvaal the hot days and warm nights and thunderstorm rains during summer promote vegetative growth, while in winter the lower temperatures, absence of rainfall and abundant sunshine favour the ripening of the fruit. In the south-eastern Cape the seasonal rhythm is somewhat similar. There is less variation in temperature and humidity and the rainfall is lower and more evenly distributed throughout the year. There is abundant sunshine. However, these differences in the climatic conditions influence the type of fruit grown. Thus grapefruit production is practically confined to the Sundays river valley (Fig. 3) where conditions are most equable ; the only other area in which this fruit is grown is in the Transvaal Lowveld and there the orchards are in the east near the Mozambique border. On the other hand, oranges are of better quality in inland situations where the more abundant sunshine, higher temperatures and lower humidities favour the concentration of the sugar content and the deepening of the colour.

The soils vary considerably. Along the river valleys of the south-eastern Cape and the Mooi river in Natal the soils are mainly alluvial and consist of deep fertile loams. In the western Transvaal most of the citrus groves have been established on soils derived from diabase and quartzite ; in some places deep loams occur but generally speaking the soils are rather sandy and deficient in plant nutrients. Zebediela Estates have been laid out in deep black soils weathered from basalt parent material, while in the north-eastern and eastern Transvaal, the soils are mostly lateritic and red earths, derived from the Old Granite. They vary from coarse sandy soils to sandy loams, and are generally deficient in calcium, potash and available phosphates.

The most serious problems confronting the South African citrus grower are associated with irrigation and soil fertilisation. In the Transvaal most of the citrus orchards are irrigated from small dams which have been constructed on the headstreams of the main rivers. In the western Transvaal these have been built where the northward flowing rivers cut through the ridges of quartzite which form the Magaliesberg and mark the northern limit of the Highveld. The orchards are situated in the Bushveld which lies some 1,000 ft. lower to the north. The supply of water from these dams is generally satisfactory, but in some instances farmers supplement their needs from boreholes. Zebediela Estates are supplied from three small dams which have been constructed where two streams flowing south to the Olifants river leave the Strydpoort ridge in which they rise. The supply from these streams is inadequate. It would appear that this area has been overplanted relative to the amount of water available and in dry years the trees have suffered severely ; recently, however, underground supplies have been found and it is hoped to make up the deficiencies from boreholes. In the north-eastern and eastern Transvaal plentiful supplies of water are available from the streams which rise above or along the Drakensberg. For the most part the water for irrigation purposes is led into canals from the tributary streams, but, in the east, water is pumped from the Crocodile river. In the south-eastern Cape, problems of a rather different nature have arisen. The water is stored in a series of Government dams which have been constructed along the Sundays and Great Fish rivers. The head-streams of these rivers rise in the Karroo where temperatures are high and evaporation considerable. Hence they carry a high proportion of salts in solution. When this water was applied to the citrus orchards, serious alkali trouble arose in a number of instances. However, extensive irrigation studies have been undertaken in the valley and, with the judicious application of water and provision of adequate drainage, the most serious effects can be avoided. A further trouble experienced in this area is the rapid silting up of the dams, caused by the deposition of the large amount of material carried in suspension by the rivers. Already the walls of the larger dams have had to be raised more than once, while in the Fish river valley a large part of the land developed after their construction has had to be abandoned. Conditions are less serious in the Sundays river valley, while all the more important valleys of the south-eastern Cape will benefit from improved supplies if and when the plan for diverting water from the Orange river comes to fruition.

Problems associated with soil nutrition have been experienced in the Lowveld of the north-eastern and eastern Transvaal, where the soils have a high phosphate-fixing capacity. Despite the liberal application of phosphatic fertiliser, the phosphorous becomes fixed and unavailable to the trees. Since an adequate supply of this mineral is essential to the production of sweet oranges, the problem is a serious one. Experiments are being carried out with the application of concentrated phosphatic fertiliser around the root zone and with the use of foliar (leaf) sprays, and some measure of success has been obtained.

As a result of the differing geographical conditions, the organisation of the citrus industry and the farming practices differ from one producing area to another.

The western Transvaal is one of the oldest citrus fruit producing areas in the country, and hence there are still a number of seedling trees in the area. However, these are being gradually replaced by

Washington Navels and more recently by Valencia Lates, and this is reflected in the export trade (Fig. 3). Most of the production is in the hands of small growers who either send their produce to the central packhouse at Rustenburg or else pack it and despatch it individually from the main stations on the Mafeking-Johannesburg railway line. There has been a tendency towards a reduction in the output from this area as some of the orchards are becoming old and are not being replaced. Generally speaking, conditions are less favourable than in the north-eastern Transvaal and in the south-eastern Cape. Low humidities and strong winds are liable to occur in August and September before the rains ; these are harmful to the blossoms and newly set fruit, while the vitality of the tree is lowered as a result of partial defoliation. Moreover, supplies of water are inadequate in some areas. As a result, this area is losing ground to the more favoured areas in the eastern Transvaal and south-eastern Cape. Citrus fruit is usually the sole concern of the growers in this area. The winters are not sufficiently mild for out-of-season vegetables. Tobacco and winter wheat are grown in rotation with sunnhemp, but not by the citrus farmers.

The northern Transvaal furnished an increasing proportion of the citrus export of South Africa in the years prior to the outbreak of war in 1939. In this area much of the acreage is in the hands of large companies, Zebediela Estates, with over half-a-million trees, being reputed to be the largest single citrus estate in the world. However, individual growers are numerous in the Tzaneen-Duivelskloof area. Uncertain supplies of water, partly associated with fluctuations in the annual rainfall, have caused great variation in the output of Zebediela Estates, which supply a large proportion of the production from this area. This is reflected in the export trade. On the large estates citrus fruit production is the sole concern, but the smaller farmers grow other subtropical fruits and vegetables as well. The exceptionally warm winters favour these, while the rail facilities to Pretoria and the Witwatersrand are good. A wide variety of fruits and vegetables are produced but mangoes, papaws and tomatoes occupy the largest acreages. Forestry is also important. Normally more than 75 per cent. of the citrus crop of the area is exported, the producing districts being served by the Messina-Johannesburg and Pietersburg-Komatipoort railways. Most of the produce moves to Capetown via Johannesburg, the rest to Lourenco Marques.

In the eastern Transvaal there are one or two large companies, but most of the production is in the hands of small growers. The White river valley is served by an irrigation scheme, but recently, with the clearing of new lands for crop production and the increase of vegetable growing, there has been insufficient water for all the producers. There is a co-operative packhouse at White river but many of the growers pack and ship their produce individually. This area enjoys excellent rail facilities, the main line from Johannesburg to Lourenco Marques following the Crocodile river valley. This and the

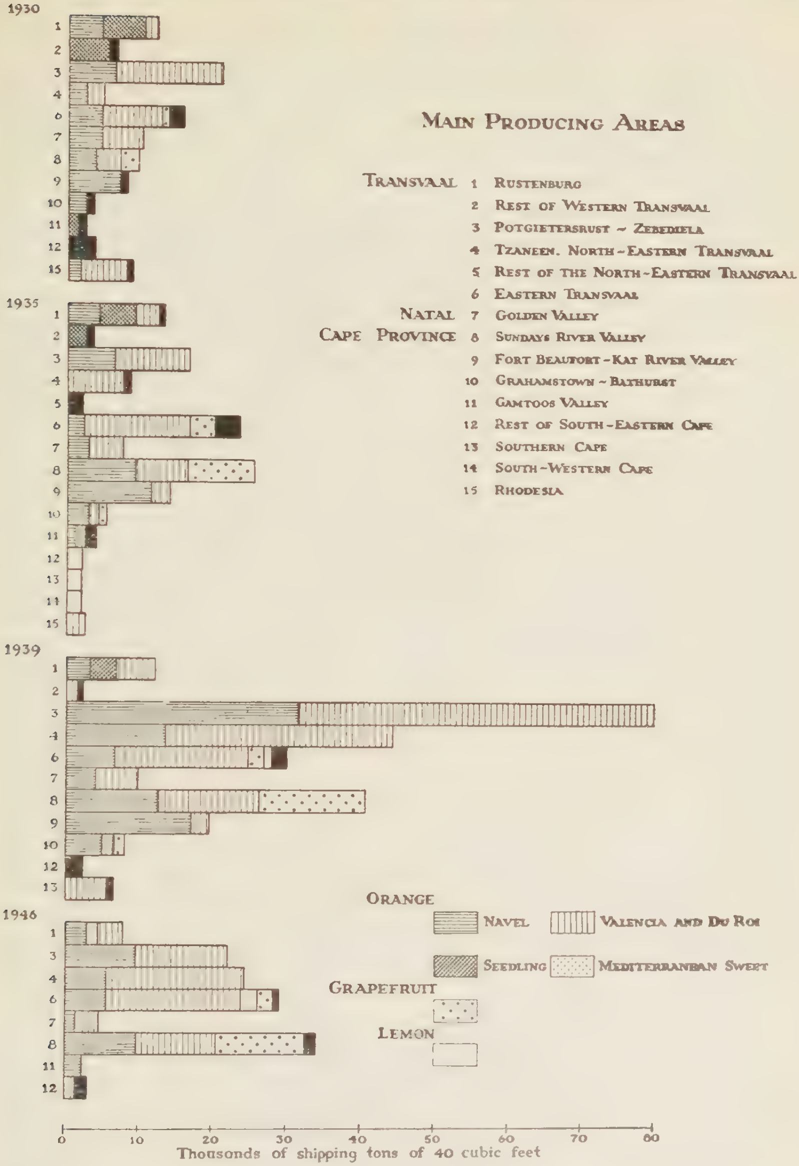

Fig. 3.—Exports of citrus fruit.
Compiled from data given in the Union of South Africa, Department of Agriculture and Forestry, reports on the Citrus Fruit Export Seasons 1930, 1935, 1939 and 1946.

warm winters favour the growing of out-of-season vegetables and a variety of subtropical fruits which can be placed in good condition on the Capetown market where higher prices can be obtained than on the Rand. These compete with citrus fruits for the land and water, but generally speaking the latter takes first preference. Despite the proximity to Lourenco Marques most of the fruit moves to Capetown where there are better handling and shipping facilities.

In both the northern and eastern Transvaal, Valencia Late oranges do better than Washington Navels and occupy the largest acreages. However, Navels are important, while recently attention has been given to mid-season varieties, especially Mediterranean Sweet, in order to spread the season. Generally speaking, the temperatures are too variable and the humidity too low for grapefruit, although small quantities are grown, especially in the east.

In the Golden Valley along the Mooi river in Natal, the citrus groves were originally laid out in connection with an irrigation scheme by a company which later sold the plots to individuals. However, the company still retains large interests in the valley. Most of the growers belong to a co-operative packhouse, whence the fruit is sent by railway bus to Greytown and thence by rail to Durban.

The Sundays river valley has long been one of the most important citrus fruit producing areas in the country. The groves stretch for a distance of 25 miles along the valley and are irrigated from water stored in Lake Mentz. The fruit is grown by individual farmers who belong to the co-operative packhouse at Addo. When irrigation farming began in this area, lucerne was the main crop. It is still extensively grown, especially around Kirkwood, where the citrus groves are younger. The old lucerne hay is ploughed in as manure. Lucerne production and proximity to the large fluid milk market in Port Elizabeth have favoured the development of the dairying industry in the valley. Dairying and poultry farming are combined with citrus fruit production so that the agricultural economy in this area is a mixed one. The more equable temperature and humidity conditions in the valley favour grapefruit, which furnish a large part of the export, while the fertile loam soils make possible the growing of good quality Navel oranges. This area enjoys the further advantage of proximity to Port Elizabeth (only 35 miles from the central packhouse), from which the fruit is exported or processed in the canning and jam factories.

Conditions are somewhat similar in the other valleys of the south-eastern Cape. Navel oranges tend to be more important than Valencia Late, again favoured by the deep loam soils and benefiting from their early introduction here. Mixed farming is generally practised, while pineapples occupy an important place around Bathurst. Transport facilities are generally good except in the Gamtoos valley, where the main road crosses the river at a number of places, making access to the railway difficult when the river is in flood.

Only small quantities of citrus fruit are produced in the south-western Cape and the export trade is negligible.

During the past 15 years there has been a marked shift in the main areas of production. The Sundays river valley has maintained a steady output, but the western Transvaal has suffered a slight decline, while the industry has expanded rapidly in the northern and eastern

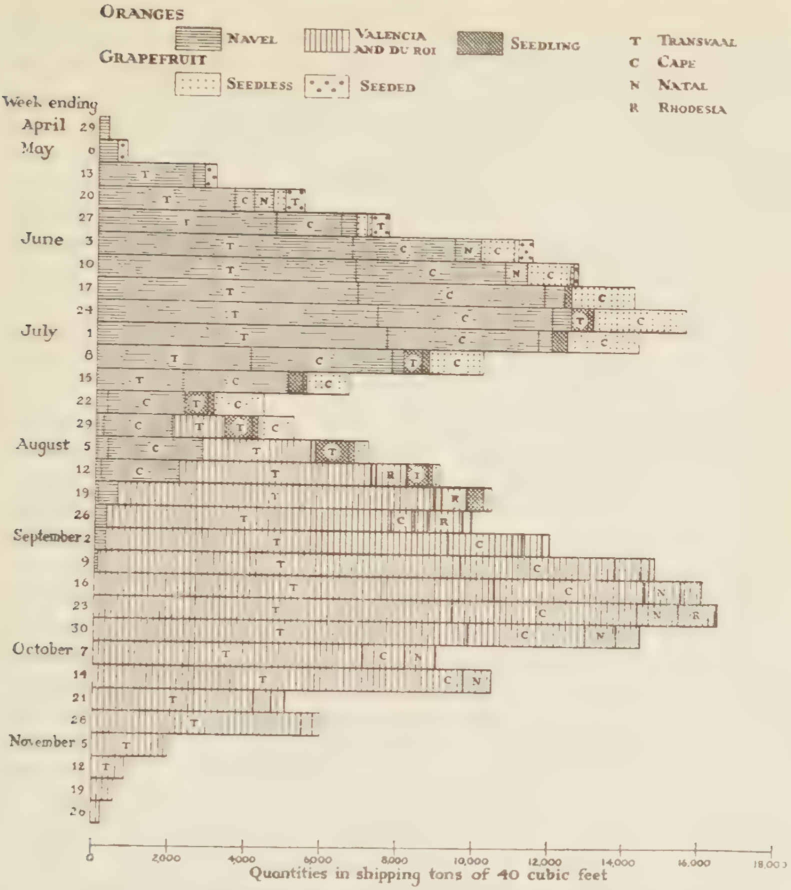

Fig. 4.—The 1939 citrus export season: weekly shipments. Compiled from data given in the Union of South Africa, Department of Agriculture and Forestry, report on the 1939 citrus export season.

Transvaal (Fig. 3). Here the groves are situated in the Lowveld, where until recently the danger of malaria had hindered development. This is now under control, good roads and adequate railway connections have been provided, and there appears to be ample water for irrigation purposes from the perennial streams rising on or above the escarpment. Storage of water is less necessary than elsewhere, and much of it is obtained either by diversion from tributary streams or by direct pumping from the main rivers. The climate is generally favourable. The most serious problems are those associated with soil nutrition, but these are being tackled by the subtropical horticultural research station situated within the area at Nelspruit. Extensive planting is still proceeding in this area, and as there are still considerable areas suited to citrus fruits awaiting clearance, the further development of the industry here seems likely. However, this will depend largely on the availability of overseas markets for the produce.

The bulk of the South African export citrus crop consists of

Valencia Late and Washington Navel oranges (Fig. 4). Smaller quantities of grapefruit are also exported. The first shipments reach the United Kingdom[3] towards the end of May and reach a first peak at the beginning of July. These shipments consist of Navel oranges and grapefruit. This season coincides with late-season crops from Brazil where the fruit is produced under more uniform and more favourable climatic conditions than in South Africa.

There is a lull in the South African citrus export trade in late July and early August, but from then onwards the Valencia Late oranges are ready and shipments increase until the peak is reached in late September. This fruit reaches England when there is little competition from other countries, although Navels from Israel and new seedless orange varieties from Spain compete with South African produce for the early November market. However, generally speaking, the South African fruit reaches the English market when there is little competition from other producing areas. Market conditions generally favour Valencia production ; this is particularly fortunate for the Lowveld producing areas where the climatic and soil conditions are most suitable for this variety.

The citrus export season is fairly well spread through the months of May to October in South Africa. This is due partly to differences in climatic conditions resulting in earlier crops from the Transvaal than from the Cape (Fig. 4), while different varieties of fruit are grown to lengthen the season. The crop is exported mainly through Capetown, which draws fruit from a number of producing areas, including those of the Transvaal. However, the Sundays river valley fruit moves through Port Elizabeth, while small quantities of Transvaal fruit are exported from Lourenco Marques. Generally speaking it is desirable to get the produce on the United Kingdom market as early as possible, and hence the saving of time which results from despatching the Transvaal fruit to Capetown by railway more than offsets the lower export cost but longer journey from the Mozambique port.

In order to help producers to lower their costs of production, improve the quality of their fruit and maintain a uniformity of standard for export, the South African Co-operative Citrus Exchange Ltd. was set up as early as 1926. This now disposes of about 90 per cent. of the citrus fruit exported. Equipment and fertiliser are purchased through the Co-operative, while a large proportion of the fruit is packed in their packhouses. Owing to the different physical conditions under which citrus fruit is grown in South Africa, it has been difficult to standardise the produce exported. However, the fruit is tested[4] before export and only that meeting certain requirements with regard to soundness, solids/acid ratio and juice content is passed. As a result there has been an improvement in the quality exported, while research work devoted especially to irrigation practices and soil nutrition has resulted in higher yields and a reduction in the quantity of fruit rejected. South African fruit has long enjoyed tariff protection in the United Kingdom market, but increased production may necessitate the finding of new markets in Europe and elsewhere, in which case high quality fruit and reduced production costs will be vital.

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[3] The journey takes two weeks.

[4] Citrus fruit is inspected at all Union ports and Lourenco Marques and also at centres in every producing area : at Rustenburg, Koster, Groot Marico in the western Transvaal, Zebediela, Tzaneen and Letaba in the northern and north-eastern Transvaal, at Elandshoek, Nelspruit, White river and Plaston in the eastern Transvaal, at Muden in the Golden Valley, at Kirkwood in the Sundays river valley, at Grahamstown, Fort Beaufort and Patentie in the other south-eastern Cape producing areas, and at Citrusdal in the south-western Cape.

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SHIH HUI YAO

A CHINESE RIVER PORT WITH A FUTURE

T. R. TREGEAR*

ABOUT 50 miles below Hankow, on the right bank of the Yangtze Kiang, stands the little town of Shih Hui Yao. It has a population of approximately 60,000. Sandstone and limestone hills, which are between 1,000 and 1,500 ft. in height, come steeply down to the river at this point and enfold the town. At one place there is a gap of only 50 yards between the cliff face and the river bank, leaving barely room for road and railway. These hills are the western edge of the Mu-ling, Ku-shan systems, which form the eastern boundary of the great Central Basin of the Yangtze or Ch'ang Kiang (Long River) as it is called in these parts. The hills increase in height as they stretch away inland to the T'ieh Shan (Iron Mountain), near Tayeh. The town extends in a narrow ribbon for about two miles along the river bank and along the railway, which runs to Tayeh.

Viewed from the river or from the overlooking hills, Shih Hui Yao looks derelict and forlorn. Ruined blast furnaces, dilapidated and rusted conveyor belts and tips, smokeless chimneys, empty offices and a silent railway testify to an active and prosperous past and convey little indication of the bright future that, given peace and wise government, seems virtually certain to come to it.

Shih Hui Yao's prosperity in the past lay—and its hopes for the future lie—in its natural resources. Here, in close proximity, are three of the essentials for metallurgical development, coal, iron ore and limestone. South and Central China are relatively deficient in supplies of coal and iron, especially the latter. In few places, south of the Tsin Ling Shan, can so felicitous a grouping be found as there is here. When to this is added the excellent water transportation facilities afforded by the Yangtze, Shih Hui Yao's good industrial prospects are clear.

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* Dr. Tregear was head of the Department of Geography at the Central China University, Wuchang, from 1946 to 1951 ; he is now lecturer in the Department of Geology and Geography in the University of Hong Kong.

The local coal is of Permo-Carboniferous age and is a soft anthracite of fair quality, though crumbly (72 per cent. carbon, 8 per cent. volatile matter, 16 per cent. ash, 4 per cent. moisture and its calorific value 13,000 B.T.U./16). This anthracite can be used industrially but is no use for coking. Metallurgical coal for this purpose must be brought by river or by rail from Hunan.

The anthracite is found in two main deposits to the east and to the south of the town and is worked in two mines, Li Yuan and Li Hua. The former, which is about a mile from the town, is the older working and is carried out on three main levels, reaching a depth of 700 to 800 ft. The hauling and winding equipment is old, ventilation and pumping are poor, propping in many places sketchy and precarious. At low levels a great deal of the coal is man handled by coolies, working naked and using carrying poles, before it reaches the tubs. Here, conditions, apart from the use of electric light, rival the description of English mines a century ago. Much capital needs to be expended to bring this mine up to a reasonable standard of efficiency.[1] However, it has some advantages. For example, loaded tubs, when brought to the top of the shaft, a quarter of a mile inside the mine, are able to run by gravity right down to the river bank, a distance of over a mile. It is a hair-raising sight to watch these tubs rattling down to the river, each manned by a coolie clinging precariously to the back, whose job it is to push the empty tub back to the mine. The quality of the coal is slightly better than Li Hua's, coming from a deeper seam, but production costs are very high, owing to obsolete equipment and the high cost of electricity, which in some months has amounted to nearly half the revenue. Li Yuan's production has averaged about 120,000 tons per annum since the war. Since Liberation, i.e., since the coming of the new regime in May, 1949. production has certainly increased considerably.

The Li Hua mine, which is newer and more efficient lacks Li Yuan's transport advantages. It is situated about three miles south of Shih Hui Yao and the road, linking mine to port, has to pass over a very steep hill range, rising and falling some 500 ft. The only means of communication at present is by this road, with its many hairpin bends. Before the Sino-Japanese war, transportation of coal from Li Hua was entirely by aerial ropeway, a bucket taking 26 minutes to complete the 4·3 km. journey. The management proudly boasts that never once was there an accident. This ropeway was dismantled and shipped to Japan during the war. An order for a new ropeway was placed with the American Steel Export Co. years ago but, owing to importation restrictions by the Kuomintang, this never materialized. Until a new ropeway can be installed, Li Hua will have to rely on motor transport. It has a fleet of good trucks but the difficult journey takes an hour and is very costly. Moreover, the wear and tear on trucks is very heavy. Only the high price of coal has made this

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[1] The new Government's emphasis is on increased production and probably the standard has already been raised.

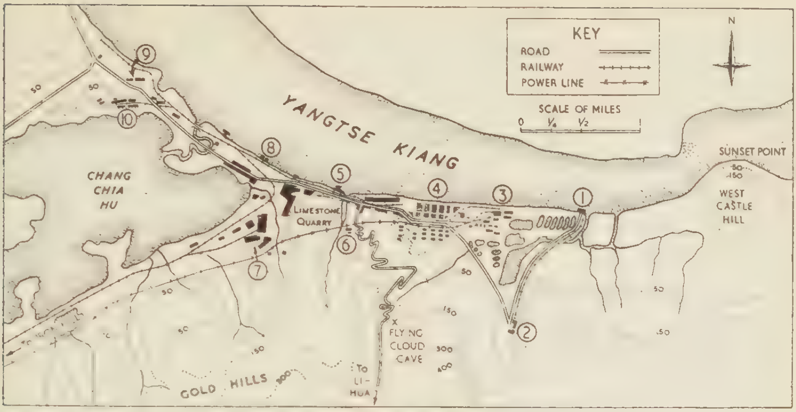

Fig. 1.—Shih Hui Yao.

Key: 1. Li Yuan Wharf. 2. Li Yuan Mine. 3. Ironworks and Power Station. 4. Ironworks Estate. 5. Li Hua Wharf. 6. Hospital. 7. Old Cement Works. 8. Iron Ore Loaders. 9. New Power Station. 10. New Cement Works.

method feasible. Even so, the mine has only just paid its way. Its production was about 120,000 tons a year and, like Li Yuan, has increased since Liberation. The known reserves of the coalfield are estimated at about 40,000,000 tons.

A high grade of iron ore (60 per cent.) is found near Tayeh at T'ieh Shan (Iron Hill) and Teh Tao Wan, about 7 miles to the south west of Shih Hui Yao. This ore field, which is one of a contact ore of granodiorite into pre-existing limestones and sandstones, is second in importance only to the great South Manchurian field. W. Smith in *Coal and Iron in China*[2] says of it: "Of all the iron fields of China, this along the Yangtze has the richest ores and is the most accessible. But its reserve is small, being estimated by the Geological Survey at but 90 million tons." The T'ieh Shan open cast iron workings are connected with Shih Hui Yao by a single track, standard gauge railway which is still in reasonable repair. It was the progressive Viceroy, Chang Chih Tung, who first exploited this ore at the end of last century, when he established the Hanyang Iron Works at Hanyang at the confluence of the Han and the Yangtze. The ore was brought up the river from Shih Yui Yao; the coal for smelting was brought down the river, via Tungting Lake, from P'inghsiang to Hanyang. P'inghsiang's Rhaetic coal measures lie in thick seams. The coal is soft but produces excellent coke, low in phosphorous and sulphur. It is the best metallurgical coal in the whole of Central and Southern China. It was not long before blast furnaces were erected at Shih Hui Yao but the site was never fully developed. Between 1920 and 1930, Japan acquired a controlling interest in the Tayeh Iron Mines and, instead of developing industry at Shih Hui Yao, chose to ship most of the ore to Japan, thus providing much needed raw material for its own iron and steel industry. Shih Hui Yao blast furnaces fell into disrepair; on the other hand loading facilities were highly developed. Ocean going ships of considerable size can tie up beneath the conveyors, no piers being needed.

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[2] *Coal and Iron in China*, University Press of Liverpool, 1926.

Now that Japanese control has been removed it is possible for Shih Hui Yao to resume its initial natural development. The Hua Chung (Central China) Iron and Steel Works has started on the enormous task of clearing debris, rebuilding and reconstruction. One small blast furnace has been completed but work has been hampered by shortage of all essential machinery. There are thousands of tons of scrap iron awaiting attention and, stacked along the river bank, are about 1,000,000 tons of iron ore, which the Japanese were unable to ship once the submarine warfare in the Pacific became too intense. Suitable limestone is right to hand to supply the necessary flux for smelting.

Other signs of revival and development are not wanting. Shih Hui Yao has long been a lime producing centre as its name indicates. (Shih-hui means lime ; yao—kiln). Before World War II a small cement factory was in production. Now, the largest cement works in the Far East (Hua Hsin Co.) has completed construction on a site about one mile west of the town. The gigantic plant was shipped direct from Milwaukee, U.S.A. to Shih Hui Yao. (It is worth noting that this direct shipping was a special concession by the Kuomintang government. Inland waterways which formerly were alive with international ocean going shipping, were reserved entirely for Chinese bottoms, with dire results for the great Yangtze ports). The productive capacity of this cement plant is 1,000 tons a day and it is calculated that it will supply the needs of the whole Yangtze valley, with its 170 million people for many years to come. Here again the raw materials and the power are all to hand. Both pure and argillaceous limestone are within a mile of the works. Powdered coal from the local mines is the fuel used in the kilns. The plant is now in full production.

The power house of the old Iron Works, the only part left intact by the Japanese, has been used for the generation of electricity for local needs, mainly in the mines for lighting and power. New power plant (3 × 5,000 kw.) has just been completed to meet the needs of future development. It will supply Wuchang as well as local needs and is intended as the beginning of a grid system to supply South Hupeh.

The town itself presents striking contrasts, which are a common feature in so many cities in China today, due to the juxtaposition of old and new. At the eastern end, adjoining the derelict iron works, is a large, well planned settlement of modern villas and workers' cottages, with metalled and properly cambered roads. This was largely the work of the Japanese after they had secured control of the Iron Works and was built to house their workers. A gloom rested over the place for many years but this is quickly being dispelled as work is resumed and the houses occupied. The rest of the town stretches out for the most part on either side of the road and railway, which follow the river bank. The buildings, all of which are Chinese and most of which were mere shacks, are gradually being replaced by more substantial modern houses, as banks and offices are being opened.

Over the last forty years it has been mainly political factors which have impeded progress here and elsewhere in China. The necessary peace and security, flowing from wise and honest government, have been lacking.

Since the victorious southward march of the Communist armies in 1949, effecting what is known throughout China as Liberation, the whole country has been divided into economic regions according to their natural resources and potentialities. South Manchuria, with its abundant and adjacent coal, iron and oil-shale, has been designated a region of heavy industry, whilst regions along the length of the Yangtze, with their restricted supplies of coal and especially iron but abundant other raw materials, such as cotton and wood oil, have been wisely assigned the role of light industry. In such a region, Shih Hui Yao, with its outstanding advantages of power, iron and good river transport, would seem assured of great and rapid industrial development.

EXPLORATION IN THE CAIRNGORMS

SENIOR SCHOOLS AT GLENMORE LODGE

R. M. Murray*

In the warm glow of firelight at the Lodge we had listened to some grisly tales of the Grey Man of Ben Macdhui. We had laughed at other people's imaginings, but now, groping through the mist on the high Cairngorm plateau, it was a different matter. The very name of the hollow, Margaret's Coffin, sheltering our high altitude camp at 3,700 feet just east of Cairngorm, suggested his presence. Understand then our feelings, a massive sub-human figure looming up through the cloud. A few paces nearer and the figure resolved itself into fantastic, Aztec-like rock sculpture, rounded pillows of granite piled on each other high above us (Plate II).

We gathered round and heard from our instructor something of the scientific problem of these " barns," as they are locally known, or tors as they are called on Dartmoor. In this unusual classroom we listened with more than normal interest for it was on this problem of the tors we had been working these past two days. At first it had seemed very odd to us, excavating trenches in the gravel debris and the soft rotted granite underneath. Would we discover the skeleton of the maiden Margaret, who had wandered heartbroken in this wild country ? Or the settlement sites of hardy, tundra-dwelling ancestors ? Not very likely, for this was not an archæological " dig." In fact it was a tor we had been exhuming, with results of considerable scientific interest.

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* Mr. Murray was from 1950–53 instructor in Field Studies at Glenmore Lodge.

Our exploration course at Glenmore Lodge, the Scottish Centre of Outdoor Training, was well advanced in its second week, and our small group, boys and girls from Senior Schools all over the British Isles, had chosen a geological and meteorological project as a practical application of some of the things we had learned. In two teams of five we alternated the arduous job of digging with the less strenuous activities of weather observing and preparing meals.

Two weather stations had been established, one in the sheltered hollow, which even in August held a patch of snow, the other on the exposed ridge above. Our studies had included weather maps and their relation to the weather we actually experienced, and so we looked forward with great interest to comparing our observations with those at lower levels. A gale had swept the plateau only the day before, but now everything was quiet, shrouded in a thick blanket of fog, which our friends down below would no doubt be recording as a layer of strato-cumulus cloud.

The work of our group was not hindered by these conditions, unlike that of another group of our companions who had chosen mapping as their final project. We had all mapped the lower country round the Lodge by simple compass and plane-table methods, but up here more practical results were desired. The great plateau extends for many miles, bare and according to the Ordnance map featureless, with few landmarks other than the occasional summits, wide shallow valleys, and the steep surrounding slopes of deep glaciated valleys. The tors however, provide remarkable landmarks, and the mapping group had planned to determine their positions, together with those of other notable features, such as the lines of white quartz marking geological dykes and the boundaries of the boulder-littered " stone desert " areas. Establishing their camp at 3,500 feet overlooking the deep glacial trough of Loch Avon, they had barely time to determine the position of a yawning gully, plunging below them, appropriately known as Hell's Lum, before the cloud closed in on them. Frustrated in their main intent they turned instead to practising that other use of their compasses, navigation. Previous experience had been limited to clear weather in the forest and open heaths of the plain. Now it was a matter of sheer necessity and the party gained in confidence as unseen objectives were safely reached in " blind " conditions.

Prior to these final projects, exploration from the Lodge had given us a broad appreciation of the resources and variety of Glenmore. We had been deeply impressed by the remarkable contrasts revealed in journeys of little more than 5 miles from our base at 1,100 feet: upwards on to the high exposed plateau of the Cairngorms, or down across the sheltered plain to the River Spey. Very soon we had learned to distinguish the several distinct regions, and the field survey methods we were taught aimed particularly at studying the physical environment (landforms, soils and weather) and the biological response

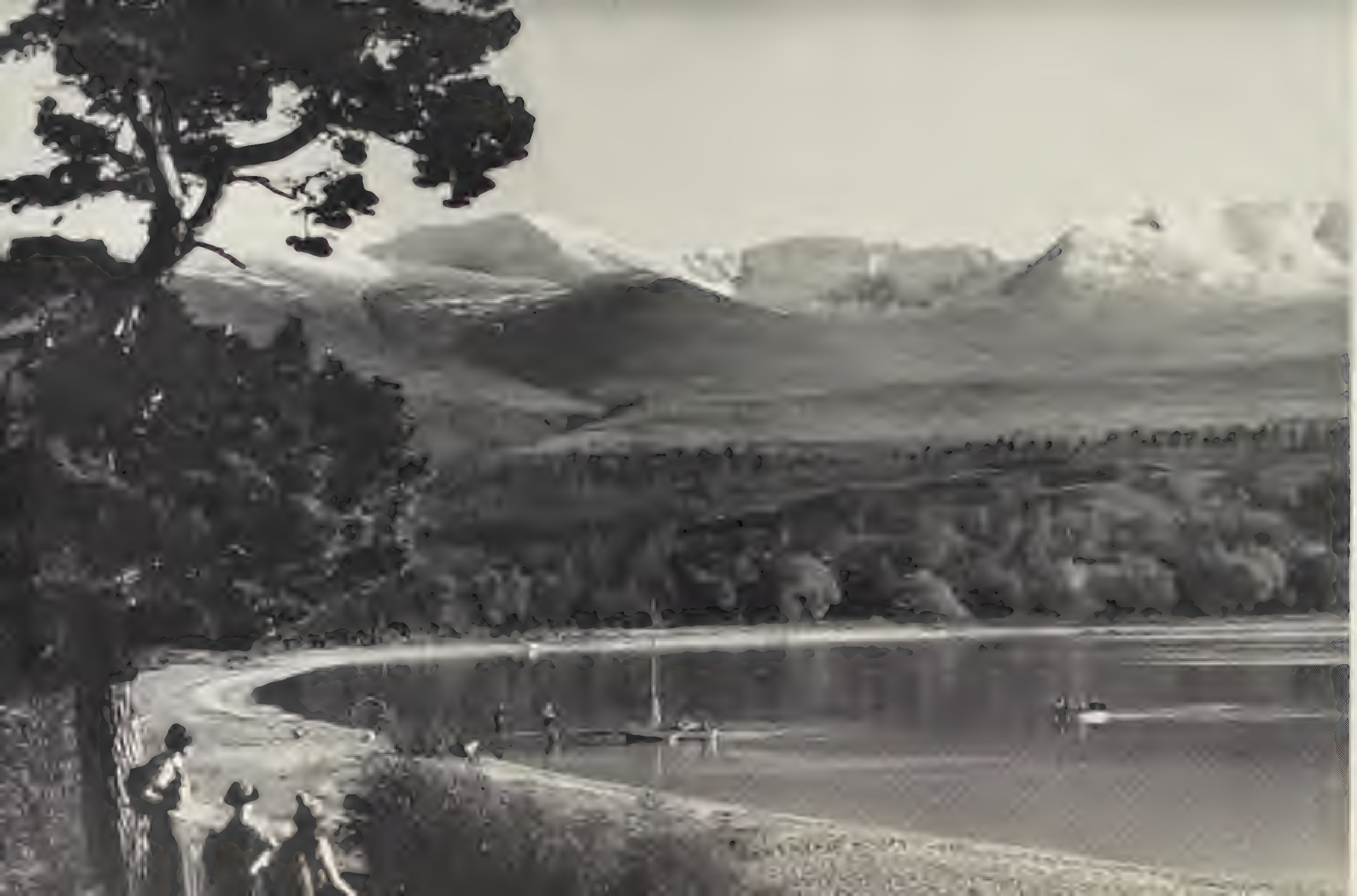
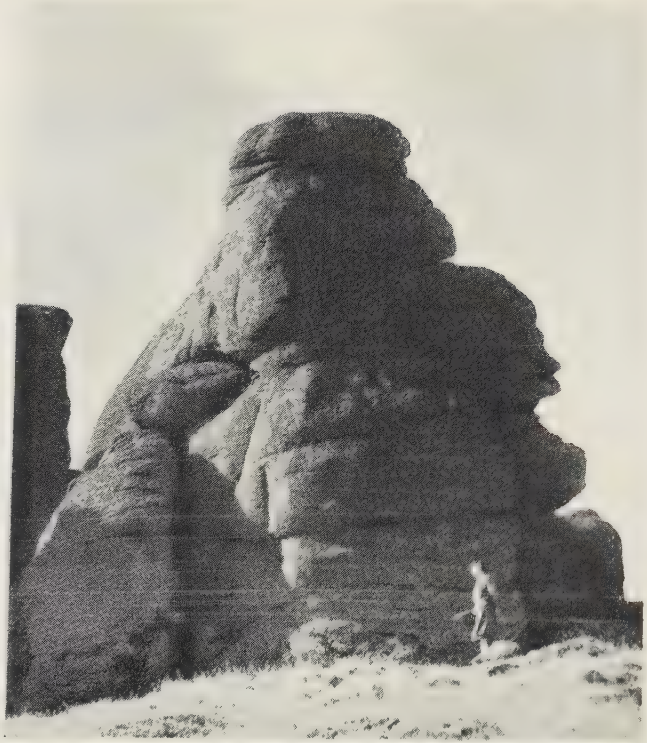


Plate I.—The corrie skyline of Glenmore; moraine (2,000 ft.) in middle distance; below, the pine forest and Loch Morlich (1,046 ft.), and, above, the corries separated by ridges leading on to the plateau (4,084 ft.).



The Barns of Bynack, on the Cairngorm plateau, resemble the tors of Dartmoor.

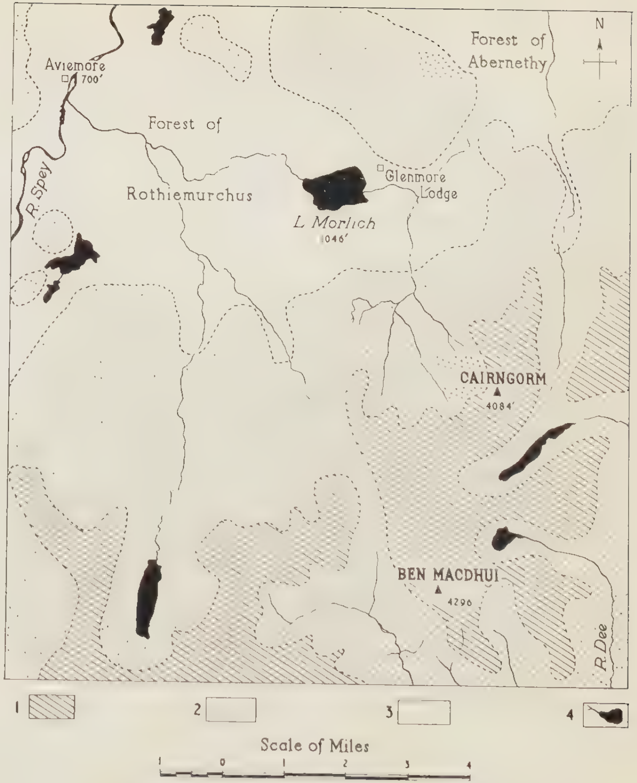


Fig 1. Map of the Cairngorm area.
Keys 1. Cairngorm plateau. 2. Ridge, corrie and moraine. 3. Forest plain. 4. River and loch.

(vegetation, wild life and man) in these very diverse worlds. We were not just identifying, for example, a particular type of vegetation, but tried to find out the factors, physical and biological, controlling its distribution, and the special characters, structural or otherwise, by which it was adapted to its particular mode and place of life. The scheme of final projects already mentioned enabled those interested to explore in greater detail the regions of their choice (see Plate I).

The famous Shelter Stone, a huge boulder from the cliffs surrounding Loch Avon, provided a convenient base just below 2,500 feet for those comparing the regions of the mountains. Here the contrasts, they discovered, were largely due to differences of altitude and aspect, but also to the differences between a heavily glaciated landscape and one little affected by the ravages of the Ice Age. From the lower slopes, flanked with hummocky moraine, they had to climb steeply up the walls of the U-shaped trough by way of a hanging valley to reach the old gently sloping plateau surface. Before exploring this area, which may soon be designated a Nature Reserve, the party had been carefully briefed on nature conservancy and the evils of collecting ; but by other methods—observation, field notes, sketches and photographs—they were able to complete a clear record of a world much more akin to the tundra lands of the far north than to the urban, industrial or agricultural districts from which they had come.

On the other side of the plateau, encamped beside the little tarn on the floor of Corrie Lochan (3,000 feet), another group explored in detail the more dangerous part of the mountain, the steep ice-plucked cliffs of the corrie wall. Rock climbing and mountain safety had formed a part of the earlier instruction, and those who had shown particular promise and enthusiasm were chosen for this particular project. The small party of six were fortunate to have as guides three of the Lodge voluntary staff, members of famous climbing clubs, but scientists in their everyday lives. At first glance bare and rocky, the cliffs were found to contain innumerable ledges and fissures with plants not growing elsewhere in Glenmore. The granite of the Cairngorms, weathering to a coarse and acid soil, does not favour a rich alpine flora, but the climbers recognised several species from previous rock-garden acquaintance.

The party exploring the plain tried out a novel form of transport, using Highland garrons (hill ponies). Inexperience led to some amusing incidents but there was general agreement on the usefulness of the ponies, especially by the "man-hauling" parties who had carried their own gear on to the high places. Surprisingly the plain was found to offer almost as great contrast of regions as does the mountain, the general uniformity of climate being more than compensated by the great variety of soil types. Here on coarse fluvio-glacial gravels is the famous Rothiemurchus Forest, largest surviving relic of the old Caledonian Forest of Scotland. The map gave a false picture of its extent, for a great deal has been felled during two world wars, and the problem of its conservation and regeneration is of aesthetic and economic as well as scientific interest. The forest shelters many interesting birds and plants which have disappeared from other parts of Britain and some of us were fortunate to see the crossbill and the crested tit. The flowers were over and we did not see *Linnea borealis* or the wintergreens, but the lovely carpet of fruiting shrubs drew our attention, the sharp but tasty blaeberry and the brilliant red cowberry. We were much less impressed with the new plantation forest at the eastern end of the plain. Despite the introduction of new species from abroad, the straight close-planted rows, meagre undergrowth and scanty wild life contrasted notably with the open natural forest of old Scots pines.

Further contrasts were noted by parties proceeding westwards to the Spey. Human activity, not lacking but barely noticeable on the mountain and in the forest, increased progressively—mixed farming on the somewhat better soils of the alluvial terraces ; main road and railway, hotels and shops in the tourist centre of Aviemore. While we admired the fine black cattle on the green meadows we were much more interested in the details of another type of grazing brought back by one of our groups. They had visited the reindeer reservation and learnt something of a scheme which may in time replace deer stalking and grouse shooting as the major human activity of the mountain.

Westwards the great river, eastwards Loch Morlich—the Lodge, green alluvial meadows and golden sand at one end, the red pines of Rothiemurchus at the other, and the mountains all around. On this lovely stretch of water we had learned yet another aspect of exploration, how to rig and sail a boat. Some of us would certainly have liked to sail on our final exploration project ; perhaps next year this could be linked with more detailed investigation of the interesting plant and animal life of the loch.

As explorers a large part of our time during the fortnight was naturally spent out-of-doors and we tended to regard the Lodge as an extremely comfortable base camp where we washed off the dust or mud of our journeys, and re-fuelled and equipped ourselves for others. Our evenings there were shared equally between work and play, at log books, preparations for the day ahead, and in *ceilidh.* Meeting together socially for song or dance we certainly learnt the meaning of at least one Gaelic word. But what lay behind all our activity of this strenuous but happy fortnight ?

This course was an educational experiment designed to show that not far from the great centres of population, and so at minimum cost, could be had all the acknowledged benefits, in the education of body, mind and character, of exploration in distant lands. It followed on a scheme, sponsored by the Scottish Education Department and the local education authorities of Glasgow, Edinburgh and Lanarkshire, which over the past three years has provided outdoor instruction, within normal school working time in the winter and spring terms, for pupils of 14–15 years from Junior Secondary Schools in the industrial belt of Scotland. Hitherto the vacation periods have been given over to teachers' training colleges and the general public, but this course provided for the first time for forty senior pupils, boys and girls from 16 to 18, at a time that did not clash with their academic work. Catering especially for those interested in geography and the natural sciences, on the point of proceeding up to University, the course was an undoubted success. The results justify further experiment in other vacation periods*, especially Christmas and Easter, when the Cairngorms are even more like Arctic lands and skis may be used with great advantage.

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VISUAL AIDS AT THE ANNUAL CONFERENCE

A REPORT

AT the Annual Conference, 1953–54, the Association's Standing Committee for Visual Aids arranged an exhibition of material useful in the teaching of geography. The exhibits were obtained from British Commonwealth sources and included dioramas from the Imperial Institute, posters, wall charts, sets of pictures and specimens of many kinds. A list of sources is published at the end of this report.

The committee also arranged a showing of four films selected to illustrate the wide range in types of films which might be used to develop children's geographical comprehension. They were: *Using the one inch map* (Gateway Films), part of a visual unit including a filmstrip and a set of one inch Ordnance Survey maps (Brighton sheet), designed to teach map reading in a particular way; *Farmers of India* (Gaumont British), a teaching film which allows the teacher a great deal of freedom in its use and presentation; *Desert Locusts* (U.S.A. Information Service), a documentary film made for adult audiences, but with possibilities for the teacher who wishes to show how a world problem must be tackled on an international basis; and the earthquake sequence from the old feature film *San Francisco*, which was included in the programme in order to suggest the possibilities of the public cinema as a source of geographical information and understanding. This last sequence and other extracts, such as the mine disaster from *Kameradschaft* and the stampede from *The Overlanders*, can be obtained from The British Film Institute, 164, Shaftesbury Avenue, London, W.C.2.

At an open meeting opportunity was given for discussion and questions on the use of visual aids in the teaching of geography. From the answers to the very varied range of questions, it was revealed how valuable is the work done by the National Committee for Visual Aids in Education. It was suggested that teachers should send relevant problems to the Secretary at 33, Queen Anne Street, London, W.1 ; in particular, the N.C.V.A.E. is anxious to learn from teachers what topics they would like to have covered by films and filmstrips.

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* Information regarding future courses and activities at Glenmore Lodge may be obtained from the Secretary, The Scottish Council of Physical Recreation, 4, Queensferry Street, Edinburgh, 2.

The views of members on the platform were expressed on rear projection, ventilation in a darkened geography room, the close study of a few selected frames from filmstrips, silent and sound projectors, and wall charts. While rear projection is a very useful device, particularly for the projection of filmstrips, it was felt that films lose something of their value by this method and the use of the epidiascope still necessitates the provision of an easy form of blackout in the geography room. Ventilation should present no real difficulty if a few children are detailed to raise the blinds or pull the curtains at convenient moments. From the floor, Mr. J. B. Hampshire of Henshaw's School, Oldham, described a rear projection unit that he has made out of a cardboard television set carton. On the subject of filmstrips, it was stressed that the provision of an adequate number of frames allows the teacher a wide and more satisfactory choice in his selection of a few pictures for study purposes ; occasionally, of course, in revision lessons or when dealing, for example, with industrial processes, it is useful to use more than the usual five or six frames in one lesson.

All the speakers on the platform agreed on the necessity of having sound projectors in primary as well as in secondary schools, but there was some disagreement on the value of wall charts ; some teachers like to use them and are slowly building up a collection ; others are not impressed by their educational value and prefer to spend their annual financial allocation on other teaching material. Finally, there was general agreement on the value of using pictures in the teaching of geography ; it was reiterated that their proper use, far from wasting time, results in more accurate knowledge and better understanding in fewer lessons.

R. C. H.

Sources of Visual Aids on the Commonwealth

Much of the material available from the following addresses is free or obtainable at a reduced rate. We are specially requested to ask members to state, in their enquiries for material, that they are actually teachers ; requests by children are often ignored as the supply is insufficient to meet demands from classes or individual children. Stamps to cover postage are usually appreciated.

Northern Ireland Information Office, 17, Lower Regent Street, London, S.W.1.
Cyprus Government London Office, 27, Cockspur Street, London, S.W.1.
Cyprus Travel Bureau, 36, Hampstead Road, London, N.W.1.

Office of the High Commissioner for Ceylon, 12, Hyde Park Gardens, London, W.2.
High Commissioner for India, India House, Aldwych, London, W.C.2.
Office of the High Commissioner for Pakistan, 33, Lowndes Square, London, S.W.1.
Malaya House, 57, Trafalgar Square, London, W.C.2.
Hong Kong Government Office, Grand Buildings, Trafalgar Square, London, W.C.2.

South Africa House (for Union of South Africa), Trafalgar Square, London, W.C.2.
High Commissioner for Northern Rhodesia, 57, Haymarket, London, S.W.1.
High Commissioner for Southern Rhodesia, 429, Strand, London, W.C.2.
East African Dependencies (Kenya, Tanganyika, Uganda, Zanzibar) : Public Relations Officer, Grand Buildings, Trafalgar Square, London, W.C.2.
Nyasaland Government Office, 11B, Lower Regent Street, London, S.W.1.
Mauritius House, 16, Upper Montague Street, London, W.1.
Nigeria Office, 5, Buckingham Gate, London, S.W.1.
Nigeria Produce Marketing Co., 5, Buckingham Gate, London, S.W.1.
Gambia Oilseeds Marketing Co., 5, Buckingham Gate, London, S.W.1.
Commissioner for the Gold Coast, Melbourne House, Aldwych, London, W.C.2.

High Commissioner for Canada, Canada House, Trafalgar Square, London, S.W.1.
Agent General for Alberta, Alberta House, 37, Hill Street, London, W.1.
Agent General for British Columbia, 1–3, Regent Street, London, S.W.1.
Agent General for Ontario, 13, Charles II Street, London, W.1.
Agent General for Saskatchewan, 28, Chester Street, London, S.W.1.
Bahamas Government Information Bureau, 29, New Bond Street, London, W.1.
West India Committee, 40, Norfolk Street, London, W.C.2 (includes Jamaica and Trinidad and Tobago Sections).
Bermuda Government Information Office, Regent House, Kingsway, London, W.C.2.

High Commissioner for Australia, Australia House, Strand, London, W.C.2.
Agent General for Victoria, Victoria House, Melbourne Place, London, W.C.2.
Agent General for Queensland, 409, Strand, London, W.C.2.
Agent General for New South Wales, 56, Strand, London, W.C.2.
Agent General for South Australia, 499, Oxford Street, London, W.1.
Agent General for Western Australia, 115, Strand, London, W.C.2.
Agent General for Tasmania, 457, Strand, London, W.C.2.
High Commissioner for New Zealand, 415, Strand, London, W.C.2.

Other Miscellaneous Sources

Colonial Development Corporation, 33, Hall Street, London, W.1.
Colonial Office, Sanctuary Buildings, Great Smith Street, London, S.W.1.
Imperial Institute, South Kensington, London, S.W.7.
Aluminium Development Association, 33, Grosvenor Street, London, W.1.
British Rayon and Synthetic Fibres Federation, Bridgwater House, 58, Whitworth Street, Manchester.
British Rubber Development Board, Market Buildings, Mark Lane, London, E.C.3.
Cadbury Brothers Ltd., Bourneville, Birmingham.
The Cotton Board, Fountain House, Fountain Street, Manchester, 2.
International Wool Secretariat, Dorland House, 18–20, Regent Street, London, S.W.1.
London Press Exchange Ltd., Irish Linen Guild, 8, Serle Street, Lincolns Inn, London, W.C.2.
The Mond Nickel Co. Ltd., Thames House, Millbank, London, S.W.1.
Petroleum Information Bureau, 29, New Bond Street, London, W.1.
Shell Petroleum Co. Ltd., Victory House, 99–101, Regent Street, London, W.1.
The Tea Bureau, 22, Regent Street, London, S.W.1.
The Timber Development Association Ltd., 21, College Hill, London, E.C.4.
The Wool (and Allied) Textile Employers Council, 26, North Parade, Bradford, 1, Yorks.

FARM ADOPTION

A SCHEME DEVISED BY THE ASSOCIATION OF AGRICULTURE

JOAN BOSTOCK*

THE Association of Agriculture was founded after the war to promote a better understanding between town and country and is now a well-established educational body. The teaching of agriculture as such, however, has never been its aim. Rather has it sought to encourage teachers in universities, colleges and schools to treat agriculture as a normal gateway to the study of biology, geography and history; for it is in the context of these subjects, no less than in the rural studies class itself, that the place of agriculture in the community and the value of the rural way of life may be most readily appreciated. Geographers have not been slow to appreciate the work of the Association and a large proportion of the members of its Farm Adoption Scheme are teachers of geography.

It is the aim of the Farm Adoption Scheme to tell in practical terms the story of a farm and its setting and to offer real examples of farming life and practice. The farms, which range from Somerset and Kent to Yorkshire and the Western Highlands, are chosen for their good farming and their contrasts. In fact, the farm "stories" differ startlingly in almost every detail and their comparisons of system, soil, climate and produce are most enlightening. For each farm a folder is produced in conjunction with a Department of Geography or Institute of Education, comprising some dozen pages, each of which treats a different aspect of the farm. In an introductory outline of the district, past and present agricultural practice is shown in relation to environment; there follow a typical photograph of the countryside together with the buildings of the farm; a map taken from the Ordnance Survey sheet; a county map showing the farm's position; details of cropping practice and field acreages, water supply and soil, livestock policy and marketing, layout of buildings, the labour situation, machinery and implements, and finally, a survey, both historical and geographical, of the local background.

The folders, which cost 5/- each, may be bought by teachers in colleges and schools of any level, both at home and overseas, and by any individual who is interested. Subscribers also receive seasonal letters on the farms which they are studying. Thus a continual link, season after season, is forged between the classroom and the countryside, bringing an understanding not only of how our foodstuffs are produced, and why they come from certain districts, but of how the farmers of these islands live. The Scheme now comprises eight farms in the United Kingdom and the Association has plans for an extension to the Commonwealth.

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* Miss Bostock is editor of the Farm Adoption Scheme of the Association of Agriculture, whose address is 238-240, Abbey House, Victoria Street, London, S.W.1.

The use of its Farm Adoption Scheme in nearly 900 educational institutions has encouraged the Association to believe that the folders are proving of real value to teachers, and to hope that it has, in fact, met at a very timely moment the needs of a changing approach in the teaching of geography. It is not suggested that the study of the folders and seasonal letters should take the place of actual visits to farms, where these are possible. The Scheme does, however, serve to stimulate an interest in the countryside and to give to town schools an opportunity of learning more of real rural geography. Of no less importance is the chance it gives to both town and country schools of appreciating differences in farming in regions other than their own. Like the Ship Adoption Scheme, the Farm Adoption Scheme offers a natural avenue of teaching to the geographer that will help to lead his pupils to a proper and vital understanding of our farmlands and an appreciation of the differences of land use the world over.

ON RE-READING H. J. FLEURE'S *A NATURAL HISTORY OF MAN IN BRITAIN*†

E. G. Bowen*

PROFESSOR FLEURE'S close contact with the Geographical Association over the span of half a century invites all students and teachers of geography to read carefully and ponder deeply over all his works. It is significant that the word geography as such does not appear in the title of this book which was published in 1951, yet it is certain that Professor Fleure would consider it to be his concept of Human Geography and, as such, it deserves the closest attention of members of our Association. Significant sentences in the Editors' Preface stress the fact that this work represents part of a survey of our natural history in relation to its background and environment, and the Author's own expanded title *The Natural History of Man in Britain conceived as a study of changing relations between Men and Environments* make its geographical character perfectly clear. Yet in turning over the pages at random it is apparent at a glance that this is no orthodox book on the Human Geography of Britain—there are, for example, only 15 maps among over 150 illustrations, while the latter range from a figurine of an English Mother Goddess to a portrait of Bobby Burns. Nevertheless, herein we find a clear expression of Professor Fleure's teaching. He is unmistakably the child of the Scientific Revolution of the mid-19th century. Before Lyell published his famous *Principles of Geology* and Darwin his *Origin of Species*, thinkers believed in the creation of the universe and of man by *fiat* some six thousand years before. Almost simultaneously, Lyell showed that the physical landscape was not static but was in a process of continuous change, being worn away and being built up ; and Darwin that man was not a special creature of the Almighty but a part of Nature and inseparable from it. Professor Fleure seeks to show that Man in the past has adapted himself to the changing physical environment and that he continues to do so at the present time. Man's adaptation to his environment is, therefore, not static but dynamic—a process that is continuous and unending. This is the central idea of Professor Fleure's view of the relation of man to his physical environment, which he conceives to be the subject matter of Human Geography. It is worthwhile pointing out in passing that here we have something that is far in advance of the cruder philosophy on this subject, so beloved by geography teachers the world over, which merely substitutes the Determinism of the Environment for the Determinism of Providence which prevailed in pre-Darwinian times. One of the immediate results of Professor Fleure's view that man's adaptation to his physical environment is a continuous process is that the chapter headings of this book follow one another in a chronological sequence. We have the Early Immigrants, Romans and Britons, The Early English and The Celtic West, The Sea Rovers, Modern Times in Britain (1066–1949), giving the book what can so easily be (and so often is by the casual reader) mistaken for conventional history. Here is the teacher's problem. How many of the studies in the human geography of selected localities so frequently presented by geography students at the Advanced Certificate level, in our Training Colleges and Universities, use similar headings and produce theses which, in fact, are studies in local history (economic or otherwise) masquerading as either human or historical geography ?

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† *A Natural History of Man in Britain* (New Naturalist Series), London, Collins, 1951, 21s.

* Professor of Geography and Anthropology in the University College of Wales, Aberystwyth.

If it is Professor Fleure's thesis that Man and all his Works are closely integrated with the physical environment then it follows that an enormous range of studies is involved in the demonstration of this fact. The Editors' Preface talks of " this vast and complex field " and the volume shows how versatile the author is in all manner of interests : archæology, folk-lore, field names, arts and crafts, geology, anthropology, costume studies, etc., etc. " Here we have," continue the Editors, " a perfect combination of the historian, anthropologist, geographer and naturalist . . . it is the fruit of a lifetime's gathering." How true all this is and how well it describes the mellow scholarship of the author. But what of the class teacher who tries to put this material over at second hand, attractive though it may be ? Has he, or she, after leaving College or University ' the fruit of a lifetime's gathering ? ' Too many so-called geographers have attempted to relay the material found in this book piecemeal and without ever understanding Professor Fleure's original thesis. It is this that has made so many of our academic colleagues express amazement at what apparently forms the content of our teaching.

There is another feature of this important book that becomes clearer the more one looks at it, and this concerns the illustrations and has nothing whatsoever to do with Professor Fleure in person. Professor Fleure doubtlessly selected his illustrations and with that we have no quarrel. What we do not approve of is the application of colour photography to scenes that are completely unworthy of it and are fantastically over-idealised thereby. If this book deals with man's adaptation to the natural environment then nothing could be more ludicrous than showing a grey, grimy, dark, damp, sordid cul-de-sac in a South Wales coal valley in colours more befitting a Californian landscape (Plate 21). Furthermore, the placing of the illustrations in the text seems to be haphazard in the extreme. It is disconcerting to read on page 143 of the growth of monasteries and cathedrals under the Roman Church in early medieval England, and to see on the opposite page a striking colour photograph of a Meeting House of the Society of Friends! Likewise, on page 179 where we are told of the Baptists, Independents and Presbyterians of 17th century England all profoundly influenced by John Calvin's insistence on the omnipotence of God, we are confronted on the opposite page with a photograph of Charles Darwin (of all people) included as a modern representative of the Beaker type. The height of distraction is reached, however, earlier in the book; on page 26 we read of the importance of the reduction of body hair in human evolution and are confronted on the facing page by an attractive photograph of the House of a Man who married a Fairy! The farmhouse is said to be near Snowdon, but the colours shown are seldom, if ever, witnessed by any except the more imaginative artists who visit these grey, rainswept, windswept, slaty slopes.

In conclusion we repeat that these matters of arrangement, which concern the production of the book in the technical sense, must not deflect us from appreciating its permanent significance as the expression of the geographical philosophy of one of the most distinguished geographers of our time, who by his long service and constant devotion to the cause, has been largely responsible for the continued growth and development of our Association.

OBITUARY

SIR JOHN LINTON MYRES

Sir John Myres has died at Oxford at the age of 84 after several years of partial physical disability but with his fine mind still working as remarkably as ever; three considerable volumes having appeared within the last two years.

Our Association has lost an honoured and devoted friend of many years standing. Some of us remember with deep gratitude seeing that fine figure slip quietly into meetings of the Association's Executive Committee where he would help with well-balanced suggestions and gather armament for the battles to secure recognition of our subject and, still more, of the philosophy on which it is founded. When battle was joined, Sir John's sharp sword was ever in the front of the fight for us. He became our president in 1925, was Herbertson Memorial lecturer in 1935, and was for many years one of our trustees. But these offices were only the outward and visible expression of gratitude for his inward and spiritual friendship for the Association. Interviews at the, then, Board of Education in 1918–20 made much more possible the sixth-form study of geography in schools, evidence to the Prime Minister's Committee on Classical Education gave our Association a new status in a hitherto rather strictly enclosed field, and in the years that followed Sir John was wont to appear whenever the Association or its officers were in danger of attack.

From 1910 until his retirement in 1939 Sir John had been the first Wykeham Professor of Ancient History at Oxford and he had gathered around this subject his wide studies of geology, geography, anthropology, archæology, folklore and tradition and philosophy. His notable range of active thought made him one of the most outstanding men of this century in the field of human learning. During the 1914–18 war he acted as an Intelligence Officer navigating among the Aegean islands, and it was a privilege, years afterwards, to sail and walk with him among those islands, the Greek people of which so obviously kept a high regard for him. His knowledge of Aegean navigation was quite unique.

Of his many publications we are especially grateful for *The Dawn of History* (Home University Library), a splendid pioneer essay written, characteristically, during a rainy holiday far from reference books, the essays gathered together as *Geographical History in Greek Lands* (1952) and *Herodotus, Father of History* (1953) as well, of course, as for the contributions with which he honoured our journal: his presidential address, " A Geographical View of the Historical Method in Ethnology," (vol. xiii, 1925–26); the Herbertson Memorial Lecture, " Region and Race " (vol. xxi, 1936); a broadcast address, " Wayside Geography " (vol. xiii, 1925–26); and an address on the Development of Geography at the Jubilee meeting of the Association in 1943, published in vol. xxviii, 1943.

H. J. FLEURE.

Professor Alan G. Ogilvie, O.B.E., F.R.S.E.

Alan Grant Ogilvie was born in Edinburgh in 1887 and educated at Watson's College, Edinburgh, and Westminster School. Proceeding to Magdalen College, Oxford, he graduated in modern history in 1909. Later he obtained his B.Sc. for a thesis on the Moray Firth. From 1909 to 1911 he studied geography, physical and human, at the universities of Berlin, Paris and London. During the Agadir incident of 1911, Ogilvie was struck by the lack of available information on Morocco, went to the Bibliothèque Nationale in Paris and compiled his first important published article (*Geogr. Journal*, vol. 39, 1912). Partly as a result, he was invited by Herbertson to join the staff of the School of Geography at Oxford. When war broke out in 1914, Ogilvie, already an officer of the Territorial Artillery, joined up and in 1915 he was attached to the Royal Engineers for the preparation of maps. His years in the Salonika area followed. As an officer in the Geographical Section of the General Staff in 1918, he was appointed a member of the British delegation at the Versailles Peace Conference. His grip of current affairs, established in peace and war, was maintained throughout his life and teaching.

After a session as Reader in Geography in the University of Manchester, 1919–20, he went to the American Geographical Society of New York under Isaiah Bowman to organise research on Hispanic America. His book *The Geography of the Central Andes*, 1922, worthily concluded this task. He became Lecturer in Geography in the University of Edinburgh in 1923, Reader in 1924, and first Professor in 1931. Except for one Sabbatical term in the summer of 1935, he had kept to the duties of university and city with little interruption. His last day, February 10th, 1954, was spent in a characteristic way. Opening at 9 a.m. with a lecture to "the First Year," he carried on with administration throughout the day until he attended a public meeting of the Royal Scottish Geographical Society in the evening. But by tragic mischance this involved an unexpected short, sharp walk, which brought on heart failure, collapse, and death.

Ogilvie was a serious and influential teacher of undergraduates of all years and he attached great value to education in schools. Distance from London prevented him from being a member of the Association's Council or its committees, but he came regularly to the Annual Conference. He gave the Herbertson Memorial Lecture for the Association at Newcastle-upon-Tyne on November 5th, 1937, delivering a valued and characteristic address on "The Relations of Geology and Geography", printed in vol. xxiii of our journal 1938. Equally characteristic were his vivid exposition of the geography of New York and its region which he contributed to our vol. XV, 1929, and the address on "Our Ignorance of Scotland, with some suggestions" with which he inaugurated our Edinburgh Branch in October, 1937, and which is published in the *Scottish Geographical Magazine*, vol. liii, 1937.

Ogilvie believed strongly in the importance of research both for the advance of the subject and for a graduate's mental development.

and although he delegated much of its supervision, he kept in touch with progress. He frequently encouraged his best graduates to carry out research elsewhere whether by foreign study without a degree, or with the useful added discipline of completing a thesis for some university of Britain, France or North America. Ogilvie also exercised an enduring influence on graduates from elsewhere who joined his staff.

Ogilvie laid emphasis on the " regional synthesis," the features and life of a given habitat and its people seen in causal inter-relationship. This, in turn, fitted into the concept of world relationships from physical to human. Ogilvie also believed in the necessity for a complementary approach to that of regional studies, namely a general view of aspects, physical and biotic, economic and social or human. Hence the form of the Honours syllabus he designed and the variety of training he sought in selecting his teaching staff, though he stressed that all should meet on the common ground of regional teaching toward regional synthesis.

As President, for 1951–52, Ogilvie addressed the Institute of British Geographers on " The Time Element in Geography." He stressed " the importance of previous evolution to our systematic study of existing phenomena in any region." He went on to discuss the rhythms of time by day and season, and their corresponding activities. He also related time to movement and speed. He then discussed the weight to be given to the effect of past events upon " the existing composition and character of a region . . . and the visible elements of the landscape." As always in his work, maps and diagrams were no mere illustrations to a text: they form documents fundamental to the theme. Concluding, he expressed his wish " to see the results of important work " in historical geography, as such, " fully integrated with the study of regions as they are." These principles pervade the manuscript of Ogilvie's book on Europe, for the first volume of which the maps and text were all but completed except for the final chapter. This work is to be concluded by his literary executor for publication.

Ogilvie's international connections and the warm regard in which he was held by fellow geographers the world over were evident at the Congress of the International Geographical Union in 1952. The fatal illness of his wife for whom he had devotedly cared was approaching its close, and he was unable to attend. An operation in July of 1953 was a strain from which, however, he had recovered sufficiently to have regained his high intellectual and teaching form within a few months. His personal qualities as a loyal colleague and sincere friend are recognised by all who worked with him; and although occasionally the very conscientiousness of his administration led to an abrupt manner, this only momentarily concealed his essential sympathy, tolerance and understanding. In character, intellect and influence Ogilvie was a fine teacher, friend and chief.

Arthur Geddes.

CORRESPONDENCE

THE SIGNIFICANCE OF PLACE NAMES IN GEOGRAPHY

I was interested to read the article in January's issue, "Significant Place Names in School Geography." I believe the importance of place names in geography—both at school and in other life—is often over-looked. This is partly because if rote learning of positions of places is suggested an accusing finger points and the voice behind it says, "Capes and Bays." A great exception was Carter who in 1929 published his *Geographical Grammar** which gave an empirical approach to this problem. Mr. Jay gives a new and more objective method of deciding what is important and I welcome his "high frequency map" of Australia.

A declared aim of many geography schemes in modern schools is to help the pupil to more intelligent newspaper reading and radio listening. To obtain an idea of the magnitude of this problem I monitored for three months the front page of a well-known daily paper (*News Chronicle*) and the headlines of the morning news, either at 8 a.m. or 9 a.m., and picked out the place names. The newspaper lists of names were classified by continents with columns for the British Isles and for "elsewhere." Each news item was treated as an entity; each place name used in it was recorded, but only once however often it occurred. If a name was included in two separate items it was noted twice, so some names were counted more than once but only if they appeared in the news for different reasons and in different contexts. From the radio news headlines place names were noted but not classified.

The figures are as follows:

British Isles	2,088
Europe	2,561
Asia	977
North America	905
South America	81
Africa	178
Australia and New Zealand	72
Elsewhere	98
Total for three months	6,960
Total for B.B.C. news headlines	679

The magnitude of the problem is apparent. Some comments on the figures may be helpful.

1. Frequencies naturally vary as different places come into the news, e.g., Australia and New Zealand during the first three months of 1954.

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* See *Geography*, vol. xv, p. 311.

However, the outstanding position of Europe should be noted. The geography of Europe should not be neglected if intelligent newspaper reading is a teaching aim.

2. Much news is pathological or abnormal—wars, accidents, storms, floods, earthquakes and domestic or international quarrels. School geography must include much else.

3. Much of the knowledge required to deal with the above is at the recognition level. I think a selection of place names known at a recall level should be backed by an acquaintance with many others.

4. The plethora of names can only really be overcome by the ready and constant use of atlas and gazetteer by the reader and by the provision of more maps by the newspapers. In both these methods how useful is a basic knowledge of key places which I suggest schools should give. I think, too, each school leaver, having used an atlas through his secondary school, *should keep it when he leaves.* There are too many homes without an atlas.

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LEWIS SPOLTON

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THIS CHANGING WORLD

EDITED BY L. S. SUGGATE

THE PROGRESS OF BENELUX

The object of the Benelux Union is to promote, through mutual agreement, the economic security of the three countries concerned and thereby to strengthen their position in the post-war world. Considered as a single unit, with a population of nearly 20 millions, the Benelux countries form an entity of major economic importance for collectively they rank fifth among the world's trading nations. From the geographical standpoint a new economic bloc astride the outlets of the Rhine, Maas and Scheldt, is a fact of considerable significance affecting the conditions of trade along the great highways serving the interior of western Europe.

By the initial agreement reached between the exiled governments of Belgium and the Netherlands in London in 1944, the two countries became pledged to an eventual economic union. The Grand Duchy of Luxembourg, through an existing partnership with Belgium, became *ipso facto* a participant in the scheme. Following the liberation of their territories, the first stage in the development of the project was marked by the adoption by the three countries in 1948 of a common tariff for imports. The second stage was reached in 1949 by the removal of internal customs barriers. At this point, often referred to as the "pre-union" stage, increasing difficulties of an economic and fiscal nature prevented further rapid progress and hopes for the declaration of the full union, intended for 1950, steadily faded.

The case for union was based on political as well as economic considerations, for the second world war demonstrated both to the Netherlands and to Luxembourg the ineffectiveness of their traditional policy of neutrality and to Belgium the futility of her alliance with France. While seeking therefore to re-establish their position by economic co-operation, the three countries are intent on preserving their identity as sovereign states.

Of particular interest to the geographer is the question of how far the economies of the two units, i.e. the Netherlands and Belgo-Luxembourg, are complementary. In agriculture, while production takes similar forms in both areas, exports from the Netherlands are normally on a much greater scale than from Belgium. The abolition of internal tariffs in 1949 provided, in theory, an outlet for Dutch foodstuffs which might partly compensate for the collapse of the German market and the limitation of imports into Britain. Largely owing to superior methods and organisation however, Dutch prices are lower than those in Belgium and the consequent fear of competition has led to strong opposition among Belgian farmers to the entry of Dutch produce. To protect Belgian interests the two governments have been compelled to modify the tariff agreement by arranging a system of quotas and minimum prices for certain agricultural commodities entering from the Netherlands.

In the case of the basic industries of coal, iron and steel, the element of competition is less marked. Coal, including coke, is of primary importance to both partners but their joint production (nearly 43 million tons in 1952) barely reaches 75 per cent. of their needs. The relative decline of the Sambre-Meuse field and the more recent developments in the virtually contiguous districts of the Campine and South Limburg bring Dutch and Belgian mining into close relationship in an area of great potential value and it should be possible eventually to integrate the two industries. On the other hand it is likely that Luxembourg will continue to rely on the Rhineland for supplies of metallurgical coke.

While iron and steel requirements in both Belgium and the Netherlands are considerable, production comes predominantly from the Belgo-Luxembourg area. Crude steel output in 1952 amounted to nearly 8 million tons from the latter and only 670,000 tons from the Netherlands. During post-war years, plans for expanding the Dutch industry were opposed by the other partners on the grounds that their own proposals for increased output, based on technical improvements rather than expansion of plant, would enable Dutch needs to be met. A compromise solution was found and despite some duplication of productive capacity, the two areas remain broadly complementary as regards iron and steel.

In various branches of manufacturing, e.g. textiles, engineering, chemicals, there is considerable competition. This is largely the result of rapid industrial expansion in the Netherlands during the past 30 years. Compared with Belgium many Dutch factories are more up-to-date and enjoy lower production costs. To the Belgian claim that prices in the Netherlands are abnormal, in fact artificial, owing to wage control, the Dutch affirm that their competitive strength is largely due to Belgium's failure to modernise and re-equip her industries. However this may be, the situation limits the prospect of full economic union, for while there is certainly a need for Belgium to rehabilitate her older industrial districts, especially the Sambre-Meuse, there is some urgency for increasing the scope of employment among the growing population of the Netherlands.

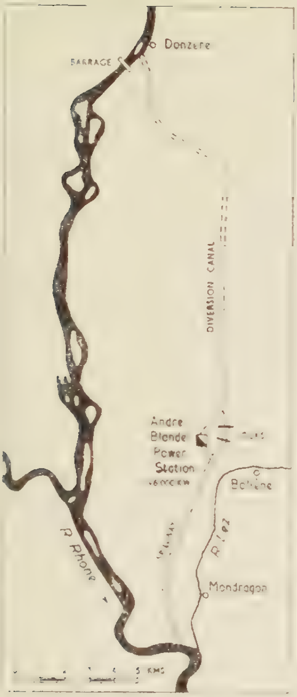
Even in a brief discussion of Benelux, reference must be made to the great ports of Antwerp and Rotterdam, between which trade rivalry has long been intense. In the post-war period both have been forced to seek new sources of traffic. Antwerp, which sustained little damage during hostilities, enjoyed a quick revival of trade, whereas Rotterdam which suffered serious destruction, recovered more slowly although it has profited from the recent growth of West German trade. The common problem of their future may reduce the mutual antagonism of the two ports and there are signs that they may eventually adopt a policy of co-ordinating their interests. Meanwhile both advocate further industrialisation in their respective countries as a means of enlarging their trade but effective co-operation between the Benelux partners cannot be achieved by unrestricted industrial expansion.

Thus, quite apart from the complex problems arising from differing fiscal systems and contrasting price structures, it is clear that only in certain sectors are the economies of the two main areas really complementary. This situation, heightened by continuing competitive tendencies, presents a major obstacle to the full realisation of Benelux. On the other hand much has been achieved since the initial agreement of 1948. Compared with pre-war years there has been a substantial increase in intra-Benelux trade. Belgium's share of total Dutch imports has risen from 11½ per cent. in 1938 to 17 per cent. in 1952 and the Netherlands' share of Belgian imports from 9 per cent. in 1938 to 13 per cent. in 1952. Moreover it has recently been announced that 90 per cent. of the internal exchanges of goods between the partners have now been freed from price and quota limitations.

University of Nottingham. K. C. Edwards.

Recent Hydro-Electric Developments in France

The Rhône Valley.—October, 1952 saw the opening of the Donzère-Mondragon barrage. This great engineering work lies below Montélimar (200 miles downstream from the barrage at Génissiat in the Rhône defile through the Jura). The 755 ft. wide dam across the lower Rhône raises the level of the river 16½ ft., the effect being felt 6 miles upstream. Half a mile above this point (see map, *after* P. George) a diversion canal takes off, with a width of 485 ft. (that of the Suez canal is 400 ft.), a depth of



35–40 ft. and a length of 10 miles. The canal is provided with navigation locks, with a record depth of 86 ft. and capable of filling or emptying in eight minutes, so that a barge may take only 17 minutes to pass through the lock gates. The canal by-passes the Rhône in a section notoriously difficult for upstream navigation through the defile known as the *robinet de Donzère*. The canal subsequently bifurcates, one arm providing water to the power station hewn out of rock at Bollène, the other being for navigation. The capacity of the power station, *viz.*, 890 million kWh., is approximately the same as that of Génissiat and is equal to a quarter of the total French Alpine output in 1946. The height of the fall utilised varies from 52½ to 85 ft. according to variation in the level of the Rhône, but this relatively low head is offset by the great volume of water passing through the turbines. The current is immediately transformed for consumption by the P.L.M. line and it is also fed into the French national grid. In addition to the major installations at Donzère-Mondragon and at Génissiat, some 20 others are planned to improve navigation on the Rhône as far as Geneva. The Donzère-Mondragon project also includes the supply of irrigation water to the *primeurs* districts around Orange.

The Rhine Valley.—In Alsace, the barrage at Ottmarsheim, on the Grand Canal d'Alsace, is nearing completion. This station is the second of a series begun at Kembs 21 years ago to be built between Basle and Strasbourg to improve facilities for upstream navigation on the upper Rhine and to provide additional power for industry, etc. in Alsace. Work at Fessenheim is now under way, a few miles downstream.

The French Alps.—At the end of the year 1952 a great dam was completed across the upper Isère at Tignes, in the Graian Alps. The site is a remarkable *verrou* below the *ombilic* which formerly provided the site of the village of Tignes. The barrage has a height of 587 ft., the highest in the French Alps. It utilises a high head of water to supply the adjacent station at Brévières and a larger one at Séez, above Bourg St. Maurice. The flow of water, regulated by the lake reservoir of Tignes, reaches a summer maximum and, during the freeze-up in the Savoy Alps, a winter minimum. The project has aroused public attention owing to the flooding of the farming community and winter sports centre of Tignes and the enforced evacuation of some 800 peasants to a newly-constructed village, about 2,000 ft. above the former one, by the shores of the lake of Tignes. The installations at both power stations exceed the power at present available and eventually additional supplies of water may be derived from the diversion of the upper Arc to the Tignes reservoir or, even more remotely, by the carrying out of the Val d'Isère project above the present dam.

In the Provençal Alps, where the fall on the Durance and its tributaries is mainly below 6,000 ft., the streams suffer from a capricious Mediterranean régime. A new barrage is now under construction at Serre Ponçon, in the *pays* of Embrunais, which is to supply water from the Durance to a power station at Ventarou. A special problem is provided by the *cluse* on the Durance, for borings made through the valley-fill fifty years ago revealed a depth of 130 ft., making a concrete dam out of the question, owing to the instability of the bed rock. The solution is an 'earth' dam constructed from river alluvium, re-inforced by marl. The barrage, which was begun in 1953, is to have a height of 377 ft. and a length of 1,968 ft., and is to be completed by 1958–59. It will be the largest barrage of its kind in Europe, impounding the waters of the Durance for a distance of 11 miles and its tributary, the Ubaye, for 5 miles. The flooding of the valleys above this dam will result in the submergence of a number of hamlets and the displacement of about a thousand people, as well as the loss of valuable farm land. The power to be generated will amount to 700 million kWh. and, in addition, water will be diverted downstream for irrigation purposes, so that " la vallée du Buesch et de la Durance pourrait constituer une immense oasis." Those who have seen the parched brown landscape of this Provençal valley during a season of abnormally prolonged drought will appreciate the value of this aspect of the scheme to the local peasantry. In addition, rural electrification of Embrunais will follow, with an abundance of power for the establishment of electro-chemical and other industries.

The Massif Central.—A new power station has recently been opened at Montpezat, on a tributary of the Ardèche, in the Cévennes. This station is supplied in part by water diverted from the upper Loire to the steep Mediterranean slope. It utilizes a fall of 2,106 ft. and has a potential of 110,000 kWh. The diversion is carried out by means of a barrage across the upper Loire at Palisse, at a height of 3,314 ft., and a 12-mile long tunnel throught the Cévennes supplies the underground station at Montpezat. Two other dams are planned on the Gage and Veyrardière tributaries of the upper Loire and also on the Loire itself at Arletempdes, where a barrage described as " the Tignes of the Massif Central " will eventually be built. To reinforce supplies from the upper Loire, the headwaters of the Allier may also be diverted by canal to the Loire, the diversion taking place through the Langogne reservoir on the upper Allier, so that the combined headwaters of the two Atlantic-flowing rivers will be turned to the Mediterranean to supply the power station at Montpezat.

(*Géographie de l'énergie*, P. George, Paris, 1950* ; " Hydro-electric Power in Western Europe," Dr. A. F. A. Mutton, *Geographical Journal*, vol. cxvii, 1951 * ; articles by G. Veyret-Verner, *Révue de Géographie Alpine*, vol. xl, 1952 and vol. xli, 1953*.)

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ALICE F. A. MUTTON.

POPULATION CHANGES IN WESTERN GERMANY, 1950–1953

The war and its consequences have left Western Germany with an addition to its population of some 10½ million refugees out of a population of 49 millions. The majority of the early refugees, arriving at a time of military and economic collapse, sought safety in country districts which were already crowded by several millions from the bombed cities. As a result, rural population densities were considerably raised, especially in eastern districts near the zonal border. By 1946, for example, the rural population of *Land* Schleswig-Holstein was nearly twice that of 1939, while by contrast the French Zone in the southwest had received few refugees, and showed little population increase.

Some recent publications give a picture of the process of adjustment, still far from complete, which has followed these events. Population movements in Western Germany for the years 1950 and 1951 are described with excellent maps and tables in two issues of the *Mitteilungen* of the Institut für Raumforschung, Bonn, No. 14 compiled by K. Horstmann, and No. 18 by W. Nellner. More recent figures are found in the official monthly statistical publication *Wirtschaft und Statistik*, which from time to time also carries articles on population topics. By 1950 the rate of abnormal population increase through the arrival of refugees was clearly slackening. Although two persons were still entering Western Germany for every one leaving, the increase in population through immigration was in this year exceeded by the natural increase through the excess of births over deaths for the first time since the end of the war. This decline in immigration and, as a result, in the rate of growth of the West German population as a whole, continued until the middle of 1952, in which year the total increase was only 403,000 as against 655,000 for 1950. It appeared at this time that the end to the great migration was in sight, but unfortunately political conditions in the Eastern Zone provoked a fresh flood of refugees. In the first half of 1953 over 200,000 arrived, a greater number in six months than had arrived in all 1952. Total population, which had been just 48 millions in 1951, reach 49 millions in October, 1953. Once more the excess of immigrants over emigrants was greater than the natural population increase. This constant expansion of the higher age groups without any proportionate increase in the number of children being born has revived the concern—so marked a feature of pre-war Germany—at the prospect of an ageing population.

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* References thus marked in " This Changing World " are available on loan from the library for consultation by members of the Association.

Of particular geographical interest is the very considerable redistribution of population that has taken place in recent years in Western Germany. In 1950 population movements were still of a somewhat emergency nature: they took the form of efforts by the State to spread the refugee population more evenly. The main movements were from the overcrowded border *Länder* of Schleswig-Holstein, Lower Saxony and Bavaria to the west and the south-west, especially to the French Zone. The decline of these government-directed mass movements in 1951 threw into prominence another trend in migration. This was the movement of individuals of both refugee and West German origin from country to town all over Germany, and above all from the border *Länder* into the industrial regions of the west, principally into the Rhine-Ruhr area, but also into the Frankfurt and Stuttgart regions.

It is quite clear that these movements are the result of the industrial revival of Western Germany, which gave people an incentive to move in search of work. The effect has been to reverse the map of post-war population increase in Western Germany, with its belt of high increases in the eastern border regions. By 1951 this belt was one of population loss through migration, while in the west a broad belt of territory with a population gain followed the Rhine from lake Constance to the Dutch border. These movements were still going on at the end of 1953, at which time about 550,000 refugees were still living in camps, mainly in the eastern border regions. The Federal Minister for Refugees stated (15th December, 1953) that it was hoped to house and re-settle 300,000 of these. Half would move to other *Länder*, mainly to North Rhine-Westphalia and Baden-Württemberg, while others would be settled on reclaimed land or on West German farms which had no male heirs. It is clear that the westward movement to the industrial Ruhr, Rhine and Stuttgart regions is destined to continue, although an agreement on the re-unification of Germany could reverse this flow overnight.

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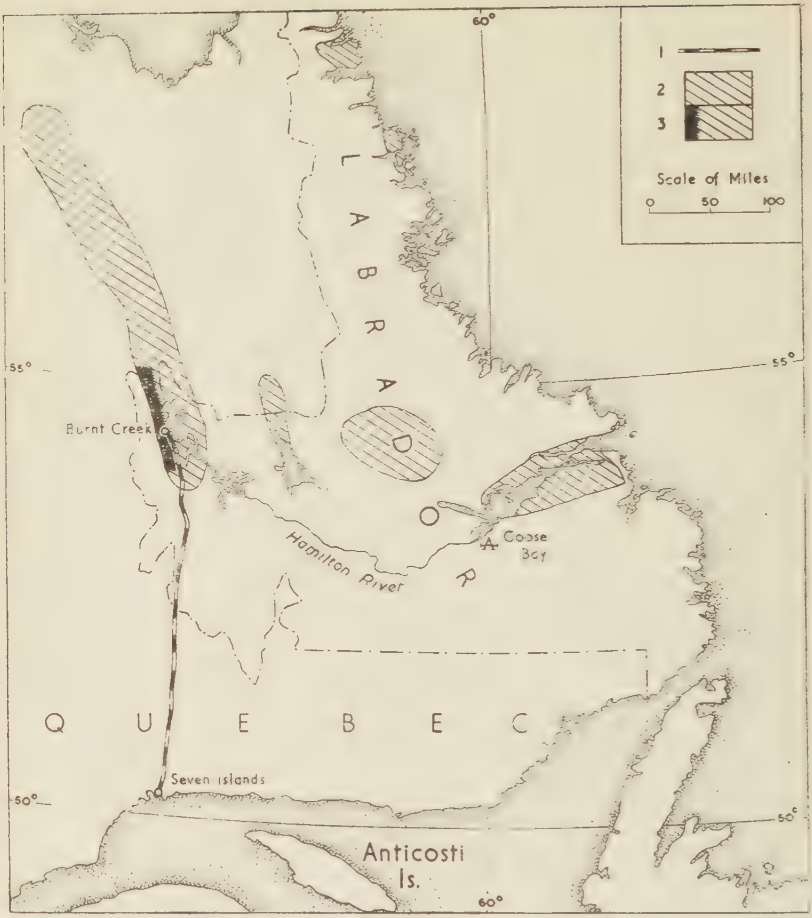
THE RAILWAY AND IRON ORE IN LABRADOR

The new railway that is being built from Seven Islands on the north shore of the Gulf of St. Lawrence to Knob Lake in the newly developed iron ore fields of the Labrador Trough (see F. K. Hare, "The Labrador



Key.—1. Railway. 2. Later pre-Cambrian rocks, largely sedimentary. Remainder of Quebec and Labrador mainly pre-Cambrian granite and granite gneiss. 3. Portion of later pre-Cambrian outcrop in "Labrador Trough" in which iron ore bodies occur.

Frontier," *Geog. Rev.*, vol. xlii, No. 3, 1952, page 416*) is rapidly approaching completion. Incorporated as the Quebec North Shore and Labrador Railway, this line will penetrate 360 miles into the most trackless wilderness to bring out the ore produced by the Iron Ore Company of Canada on their Knob Lake concessions. The steel reached Knob Lake, the northern terminus in mid-February, 1954, well ahead of earlier estimates, optimistic though they were. Ballasting will be completed during the summer of 1954 and it is expected that the first shipment of ore southwards will take place in August or September. The line has common carrier obligations and will be available for general services to others than the Iron Ore Co. of Canada. It will not, however, carry passengers, and the new mining town, to be known as Shafferville, will be linked with the outside world solely by air as far as passenger traffic is concerned.

McGill University, Montreal. F. K. Hare.

WHY AMERICAN INDUSTRY "MOVES SOUTH"

That industrial expansion is taking place in the southern U.S.A. is well known. In 1850, only 1 person in 82 in the southern states was engaged in industry, whereas for New England the figure was 1 in 8. By 1947, the south had a ratio of 1 in 16 and New England of 1 in 1. The publication in 1949 of a report (*Why Industry Moves South*) by the National Planning Association has by no means put an end to discussion about the true explanation of this phenomenon. The authors (G. McLoughlin and S. Robock) of the report found three main reasons for the change. In 45 per cent. cases examined, it was the attraction of expanding southern markets; in 30 per cent. it was a move towards materials or power ; in 25 per cent., labour supply governed the decision. Expanding markets reflect the rise in southern incomes, begun during the war and since maintained as the standard-of-living differential narrows. Cheap power in the land of the T.V.A. and the Gulf oil and gas fields needs no comment. Southern materials were normally all too often shipped raw or little processed to northern factories ; now the south is working for itself, with special emphasis on petro-chemical industries based on the region's minerals (" The South's Big Stake in Technology " is the title of a recent article).

Over the southern labour supply, argument and misconception continue. It is suggested that southern labour costs less than, say, north-eastern. Whereas this was formerly true, it seems certain that it is no longer the case—firms with plants in more than one region pay the same wages in all. It is suggested that southern labour is more (or sometimes less !) efficient than that of other regions. Several researchers, however, assert that differences are based on management and equipment ; worker for worker the differential is negligible. It is suggested that in the south labour law and trade unionism are both less restrictive upon production than elsewhere. This seems to be true, but not greatly to have influenced location. The real advantage of southern labour seems to lie in its attitude to work in industry. For the rural population of the south, factory work represents not social stigma (" No mill for my Johnny") but social advancement. This attitude rests (1) upon the difference between average income in southern agriculture and industry—a difference between $1,735 and $2,900 in 1949—and (2) on the generally low income level in the south, variously attributed to (a) the scarcity of large cities, where wage rates are always higher than in small ones, (b) the low level of capital investment throughout the south, or (c) the coincidence that the main southern occupations, both agricultural and industrial, are characterised by low rates of return per unit of labour input.

Once established, southern industry tends to thrive on favourable climate (low heating costs, etc.), low levels of absenteeism, and modern plant, often combined with model housing and community schemes for the workers.

The outstanding industrial " capture " of the south is, of course, the cotton textile industry, formerly of New England. (*Only* the cotton textile industry is involved ; woollens are following only slowly, while the class "Apparel and related products " remains concentrated in the north-east). Here the south has definite advantages (recently cited by S. E. Harris in *The Economics of New England*, Harvard, 1952), notably (1) efficiency of its new mills over those of New England, (2) cheaper power supplies, (3) cheaper cotton supplies, and (4) lower taxes. Property taxes are quoted by Harris as being five times as high per spindle in New England as in the south, where newly-opened plants often receive tax concessions and similar aids.

None of these students has yet made the following point : the industrial growth in the south has coincided with the entry of the American government into economic affairs. Beginning with the New Deal legislation of 1933 and after, there has occurred government intervention on a new and, to Americans, unfamiliar scale. Under the laissez-faire policies of the past, the south continually complained of discrimination against itself. Now, as economic development increasingly becomes a matter for governments, i.e., for politics, the south is proving that, among the regions, it can shout as loudly for itself as any other (statistically, *more* loudly, in terms of representation). Much recent industrial expansion has been government-sponsored or government-financed, and of this the vocal (and, to the Administration, fickle) south has received its full share.

University of Cambridge. J. H. PATERSON.

RESEARCH ON "HIDDEN DROUGHT"

Seabrook Farms, in southern New Jersey, is the world's largest integrated farm-freezing operation and accounts for 14 per cent. of the annual pack of frozen vegetables in the United States. It has grown from 57 acres to 19,000 in 50 years. In 1945, John M. Seabrook sought means of dealing on a scientific basis with the many climatic and meteorological problems associated with the farm enterprise. In 1947, the Johns Hopkins Laboratory of Climatology was established at Seabrook Farms under the direction of Dr. C. W. Thornthwaite. The university recognised that the opportunities for research in agricultural climatology were unparalleled in a place where fundamental problems and applications were both present on every side. A course of study was developed and a limited number of students has been accepted for graduate training. The following is summarised from a recent statement by Dr. Thornthwaite on his research (38th State Agricultural Convention, Trenton, N.J. 27th January, 1953).

Detailed work has been carried out on drought and on the moisture factors in agriculture. It has been found that hidden drought, which brings about a borderline soil moisture deficiency, often holds crop yields to as little as a third of the potential. Supplemental irrigation is the cure for drought, which is a climatic condition in which the amount of water needed for transpiration and evaporation exceeds the amount provided by precipitation. Soil moisture is used up, and plants then suffer from lack of water. Drought is easy to recognise in the arid and semi-arid regions, but the hidden drought of the humid regions is generally overlooked. Even when showers seem to be frequent and abundant, if the rainfall is not equal to the water-need there is a borderline water deficiency or hidden drought. It is felt that drought is of almost universal occurrence and constitutes the greatest natural hazard to agriculture. Hidden drought is a real threat in all of eastern United States, and New Jersey is no exception.

In the Laboratory at Seabrook, means of determining the evapo-transpiration have been investigated. An irrigation schedule can be set up as a sort of bookkeeping procedure and the moisture in the soil may be regarded as a bank account. Precipitation adds to the account, evapo-transpiration withdraws from it. It is merely needed to keep track of the evapo-transpiration and restore by irrigation whatever is not promptly returned by precipitation. This avoids over-irrigation and at the same time assures that soil moisture is never deficient and that the plants never show signs of distress. This system is used for scheduling irrigation at Seabrook Farms. With the solution to the problem of when to irrigate, a great forward stride toward scientific irrigation has been made. But irrigation farming is not just ordinary farming with irrigation; we must fit irrigation into other necessary farming practices such as cultivation, weed and pest control, and fertilisation. The results obtained at Seabrook demonstrate what scientific irrigation can accomplish when supported by the best cultural practices and the use of proper fertilisers.

The southern counties of New Jersey contain more than two and a half million acres of land, but only four hundred thousand acres were in harvested crops in 1949. At least one and a half million acres are considered non-arable waste land. The soils of this area, which is a part of the Atlantic coastal plain, are generally sandy and incapable of storing much water for the use of crops during periods of summer drought. Since the soils dry out so completely in summer the vegetation is ravaged by fire. It is made up of stunted and fire-damaged pine and oak scrub. Large sections are known as the barrens and are considered worthless. At Seabrook Farms experience has recently been gained in irrigating this kind of land and it is clear that it possesses great hidden potentialities. The chosen area was of poor sandy soil, covered with a woodland of scattered pine and jack oak which, although burned over many times, had never been cleared and cultivated because the soil was considered to be too poor for crop production. All of the industrial waste water from Seabrook Farms has been disposed of in the woods since 1950. It is pumped into irrigation lines and discharged on to the land surface through giant nozzles, each of which irrigates more than an acre. Through the three seasons that this system has been operating, the water applied averaged about 35 inches a week. The average artificial rainfall in the woods has been about 600 inches a year and the maximum in a part of the woods in 1950 was 1,200 inches. These large quantities of water have brought about a great change in the vegetation. The open woodland has been transformed into a jungle of weeds and other plants new to the area. Furthermore, the organic material in the soil has increased greatly. The rapidity of the change has been phenomenal.

A large part of southern New Jersey has the same sandy and droughty soils as the Seabrook Farms water-disposal area. Almost everywhere, however, ground water is readily available for irrigation within a few feet of the ground surface. Therefore, it is ideally situated to make profitable use of scientific irrigation. Although this vast area is non-arable by ordinary standards, when water is applied to it by proper irrigation and its mineral deficiencies are rectified by correct fertilisations, it can be highly productive. If this waste area, that now produces nothing, were reclaimed and planted to potatoes it could easily produce five hundred million bushels a year ; more than has ever yet been produced in the whole United States. This is only an illustration of the potentialities of this neglected region.

Syracuse University, N.Y. R. E. Dickinson.

Prospects for Agricultural Development in Latin America

One of the overriding problems of Latin America to-day is whether agricultural development can keep pace with the relatively high and in recent years accelerating rate of increase of population and also with the rising *per capita* demands for food and raw materials in areas where industrialisation is proceeding. If the standard of living is not to slip back, primary production as a whole must develop at a rate sufficient to maintain domestic food supplies and also to procure the necessary imports of capital goods. The Report with the above title, recently issued by the Food and Agriculture Organisation of the United Nations, by limiting itself to the agricultural contribution to the developing Latin American economy, perhaps makes too restricted an approach to the problem, in view of some current mineral developments.

In Latin America as a whole, population has increased by over 50 per cent. since 1934–38 ; rice, cassava, potatoes, edible oilseeds, pulses, sugar, bananas, cotton and hard fibres have exceeded this rate, while wheat, maize, sweet potatoes, meat, cacao, coffee, wool and inedible oilseeds have failed to keep pace. Certain areas are afflicted recurrently with more than usually serious food shortage. Periodic droughts bring famine to north-eastern Brazil. In 1952, drought, too, was partly responsible for Argentina's need to import wheat and to restrict consumption not only of wheat but of meat. Bolivia and Chile have also found it difficult to maintain a stable food supply.

It is estimated that only about 5 per cent. of the total area of Latin America is arable. Dr. Alberto Boerger has recently drawn attention to the limitations of much of the remaining area ; the low carrying capacity of the southern prairies of Argentina, the poverty of the semi-arid lands on the western slopes of the Andes, the unreliability of crops in north-eastern Brazil and the short life—two or three years—of the fertile layer when the Amazon forest is destroyed. Altitude is the limiting factor in much of the Andean belt, excessive rainfall in southern Chile and drought on the Peruvian coast. Efforts to increase production have so far been principally by irrigation or by colonisation. The countries with the greatest percentages of their total arable irrigated at present are Peru (75), British Guiana (50), Mexico (22) and Chile (22). Except in Chile, irrigation has been mainly for tropical or sub-tropical crops. The largest areas to be irrigated by projects now under construction are in Mexico, Chile, Peru and Venezuela. The area in the semi-arid zone along the Andes foothills and in Patagonia, which Argentina planned to bring under irrigation by 1947–51 would have added more than the total programmes of all other Latin American countries, but only part seems to have been completed. This Report assumes that in all Latin America there will be no more than one million hectares added in the next four years, which would account for only 10 per cent. of the overall production targets. A considerable proportion of the irrigation works are primitive and liable to be washed away or at least to involve high upkeep costs. In most countries there is little attempt at water storage. Financing of construction and maintenance is in many cases erratic.

Latin America has reached a stage in development when expansion is most likely to be not on the margins of existing settlement but in the form of isolated nuclear groups at selected points, often far removed from the present frontiers. The Report considers that the outstanding example of a successful colony of this kind is Tingo Maria, in Peru, where 20,000 persons have settled since 1936, helped very largely by the establishment of an experimental station in 1938. The increase of its agricultural shipments from 3,700 tons in 1946 to 22,000 tons in 1950 shows the limits of such colonies in terms of agricultural production. The other method, of more intensive settlement through subdivision of large estates, is only very cursorily mentioned.

In the already cultivated areas the originally deficient soils in large sections have never been raised to adequate levels of fertility ; on the contrary, there is thought to have been a continuous deterioration. In Brazil it is found that 95 per cent. of the organic matter in certain tropical soils is lost after two years of cultivation. The Report also notes the spread of mechanisation from large to medium holdings, partly under the stimulus of the drift of rural population to the areas of industrialisation.

The Food and Agriculture Organisation has here assembled much factual information on current agricultural plans and plentiful statistical material, though some of the latter is regionalised into four largely climatic groups—Mexico and Central America, the Caribbean, Tropical South America and Temperate South America. In all, there is much to interest the student of land utilisation and settlement.

University of Edinburgh. C. J. Robertson.

Canberra Grows Up

A tiny hamlet in 1913, Canberra in 40 years has become one of the handful of large inland towns in Australia. At the last census (1947) Canberra's population was 15,156, and it was outranked by Broken Hill, Maitland, Goulburn, Lismore, and Lithgow in N.S.W., Ballarat and Bendigo in Victoria, Toowoomba and Ipswich in Queensland, and

Kalgoorlie in W.A. The latest estimate (30th June, 1953) for Canberra is 27,884, and it is unlikely that any of the other centres are expanding so rapidly as this (84 per cent. in six years). Another decade may well see the national capital the largest inland town in Australia, a place held in 1947 by Ballarat with 40,181. The growth of the city is discussed more fully in a recent paper by H. W. King ("The Canberra-Queanbeyan Symbiosis: A Study in Urban Mutualism" *Geogr. Rev.* vol. xliv (Jan. 1954);* the figures which follow are those of the Censuses of 1911, 1921, 1933, and 1947, and estimates (all as of 30th June) by the Commonwealth Bureau of Census and Statistics.

The 1953 population was over double that of 1945; four times that of 1927 (when Parliament first met at Canberra); twenty-five times that of 1921, when the building of the city really began; and one hundred times that of the hamlet of Canberra in 1911.

The populations of 1,150 in 1921 and 3,500 in 1925 were mainly building workers; the transfer of some Commonwealth Departments from Melbourne in 1927 brought the figure to 6,640 in the next year. The depression years (1929–33) saw some slackening, but the loss of building workers was offset by further transfers of public servants, and the 1933 total was 7,325. After 1933 building activity revived and the population increased by 37 per cent. to 9,830. During the war a peak of 13,300 was reached in 1943, when the staffing of governmental agencies was at its maximum. After the war expansion was rapid:—

1946 ..	14,100	1949 ..	19,670	1952 ..	25,035
1947 ..	15,156	1950 ..	22,130	1953 ..	27,884
1948 ..	18,060	1951 ..	23,150		

This rapid post-war expansion has been brought about primarily by a great increase in Commonwealth building activities, which has brought large numbers of Australian and "New Australian" (i.e., European immigrant) workers into the city; other important factors are a great increase in the diplomatic population, the establishment of the Australian National University (academic and administrative personnel 526, excluding families), and the setting-up in Canberra of central secretariats for such nation-wide organisations as the Associated Chambers of Commerce and of Manufactures—these last signs of approaching maturity as a capital.

Within the last few years suburbs have spread out from the two original nuclei north and south of the Molonglo River, and now extend for over five miles between the extreme points of the built-up area, which is broken up by belts of parkland as well as a strip of farmland along the Molonglo. Distance is thus a burden in the day-to-day life of the population, and the speed of development has brought other problems. To meet the urgent need for housing large groups of "pre-fabs" have been erected and pre-war building standards have declined to some extent; some "temporary" buildings seem likely to be all too permanent. Shopping and other service facilities also lag somewhat behind the growth of population; and a problem which may become acute in a few years is that of the provision of employment, apart from government service, for the rising generations.

Australian National University, Canberra. H. W. KING.

LAKE GEORGE AND LAKE BATHURST

Since 1949 Lakes George and Bathurst in the Southern Tablelands of New South Wales have been nearly as large as at any time since their discovery in 1820 and 1818 respectively. Lake George is indeed a noble stretch of water, stretching some 15 miles north-south, with a maximum width of 7 miles, and flanked on the west by the remarkably straight and bold Cullarin Scarp, which in a distance of 400–500 yards rises 700 feet above the lake level of about 2,200 feet. The main road from Sydney to Canberra runs for some miles along a narrow " coastal plain " between the scarp and the lake ; but recently-deserted homesteads along the shore, wind-pumps standing well out in the water and turning merrily to no purpose, and fences running out to disappear gradually beneath the surface, tell visibly of the long periods when this shallow lake entirely disappears and when the grazing leases which divide its floor are actually used for grazing ; for a few years they are more likely to be used for fishing, as anglers' societies propose to stock it with Murray cod. To-day shags and pelicans, fish and sailing boats race over flats where the merinos browsed but a few years ago. Similar vicissitudes affect Lake Bathurst : air photographs of 1941 show much of the present lake-bottom patterned with plough-furrows, but now the farmers on bordering stations ponder the economics of siphoning the lake basin.

Along with the much smaller " lagoons " of this little endoreic region—some of which lie on the flats of only semi-determinate drainage which locally occupy the " Great Dividing Range "—these lakes raise questions of interest in both hydrology and geomorphology. A succession of years of super-normal rainfall, especially with unusual concentration in winter, brings up the water-levels ; this has happened five or six times since the discovery of the lakes. Rainfall and evaporimeter figures at the Lake George meteorological station are sufficiently close as to suggest that the threshold conditions of permanent lakes and external drainage are not far removed. Lake Bathurst really consists at present of two large lagoons, with several other marshy flats near at hand, lying in an area of gently undulating topography but separated from Mulwaree Creek, to the west, by a long and narrow ridge, about 150 feet high. At one point there is a gap, about 20 feet above the level of the Creek, and apparently blocked by deposition from it. In 1883 Lake Bathurst actually overflowed into Mulwaree Creek, and thus drained to the sea by the Wollondilly and Nepean (Hawkesbury) Rivers ; and there may well be fairly persistent percolation through the sands and gravels of the gap.

From what is known of the surrounding geological structures, such underground loss of water does not seem possible from the larger Lake George. Progress in knowledge of the regional geology is tending to weaken the basis of Griffith Taylor's stimulating pioneer explanation (1907) of the origin of Lake George as occupying a fault-angle depression. The Cullarin Scarp was considered a late Tertiary or Pleistocene fault-scarp, which defeated and ponded the headwaters of the Yass River, a tributary of the Murrumbidgee ; and this explanation was supported by the fact that the projections of three creeks falling into the lake on the east converge on Geary's Gap, a col at 2,300 feet plus which is the only break in the western wall. But recent work by officers of the Commonwealth Bureau of Mineral Resources indicates that the main faults of the nearby Canberra area are early Devonian in age and that the major relief lineaments are also ancient features. By analogy the Cullarin Scarp (following a fault no longer regarded as a normal one but as a thrust fault) may also be an old feature. The Cullarin Scarp may be either a resequent fault-line erosion scarp or a resurrected fault-scarp, but in either case it seems that it cannot be the proximate cause of the ponding-up, since its origin is in all probability so ancient that the entire basin would long ago have been filled up with sediment. Thus we are led to an alternative theory which has been proffered to explain all the lakes and lagoons of this region, namely the disruption of a former meridional river-system by gentle Tertiary warping on an east-west axis.

Australian National University, Canberra. J. N. JENNINGS.

GEOGRAPHICAL ASSOCIATION

HONOUR TO PROFESSOR DUDLEY STAMP

We extend cordial congratulations to our past-President, Professor L. Dudley Stamp, on the award to him of the Vega Medal, to be presented on April 26th by the King of Sweden. The Vega Medal is awarded annually by the Swedish Society of Anthropology and Geography.

"THIS CHANGING WORLD"

The Executive Committee takes this opportunity of extending very warm thanks to Mr. Suggate (editor of the section) and the numerous contributors who are sending material for this valuable new feature of *Geography*, for which members of the Association have already expressed their appreciation.

COVERS FOR *Geography*

A proposal has been made that stiff covers should be made available for purchase from headquarters, designed to hold and preserve one or two volumes of *Geography* without formal binding. We should be glad to know how many members would welcome such a provision, so that likely costs may be assessed in the light of such demand. Action would be taken if sufficient demand were indicated.

SCHOOL GEOGRAPHY SYLLABUSES

It has been decided to offer, in response to requests from members, advice regarding syllabuses for geography in Secondary Modern and Primary schools. Members seeking this advice should send their enquiries either to headquarters or directly to the chairman of the appropriate section committee: Secondary Schools Section: Mr. J. A. Morris, 9, Ringwood Way, Winchmore Hill, London, N.21; Primary Schools Section: Mr. G. H. Burden, 44, Wickham Chase, West Wickham, Kent. A stamped addressed envelope should accompany each enquiry.

GIFTS TO THE ASSOCIATION

Council acknowledges with gratitude a further gift of over 200 books in addition to the lantern slides from the estate of Mr. James Fairgrieve. Important new additions to the library amongst these will be mentioned in *Geography*.

An anonymous gift of £15, earmarked for office and library equipment at headquarters, is acknowledged with grateful thanks to the donor.

BRANCH NEWS

Bournemouth Enquiries have again been received about the possibility of re-forming a branch in the Bournemouth-Ringwood area. Members in that locality who would be interested in branch activities there are asked to write without delay to headquarters.

Lincoln We acknowledge with gratitude the gift of £30 from the Lincoln Branch to assist in meeting the costs of publication in *Geography* of two papers for which there was much demand amongst members after the Spring Conference held at Lincoln in April, 1953. The inclusion of these papers, by Professors K. C. Edwards and D. L. Linton, accounts for the enlarged size of this issue of *Geography*. A pamphlet made up of these two papers will be made available for purchase.

SUMMER SCHOOL, SISTRANS, AUGUST, 1954

As this copy goes to press, only a few vacancies remain available for this course which is to be directed by Mr. R. C. Honeybone. Early application is essential either for these or for any which may later result from cancellations.

SECOND INTERNATIONAL CONFERENCE OF TEACHERS OF GEOGRAPHY

The Second International Conference will begin at Hilversum, Netherlands, on Monday morning, August 23rd, with speeches of welcome and introductory lectures, and will end on the morning of Saturday, August 28th, 1954. Copies of the provisional programme are now available on application to the Conference Organiser or to headquarters of the Geographical Association; one of the lectures will be given by Professor L. Dudley Stamp and Professor S. W. Wooldridge and Mr. L. S. Suggate also hope to attend the conference.

The charges for accommodation, excursions, etc., will be £8 10s. (sterling) from August 23rd to 28th, and individual requests for reservations should be addressed to the Conference Organiser, Professor A. C. de Vooys, Drift 21, Utrecht, Netherlands. It is hoped that a representative gathering of British teachers will join the meetings and provisional accommodation reservations have been made for members of the Geographical Association who have already intimated their desire to attend the conference. Efforts will be made to arrange for a group to travel as a party ; members who have not already done so are urged to inform headquarters **at once** if they wish to join such a party, as travel reservations (during a very busy month) must be made now. Information on travel and the conference programme will be sent on request from headquarters ; a stamped addressed envelope should accompany enquiries.

Spring Conference, 1955

The Spring Conference next year will be held in York. Dates and further details will be issued to members later in this year.

Summer School, 1955

Plans are now under way for the organisation during August, 1955, under the direction of Professor E. G. Bowen, of the Summer School in Brittany which was postponed from 1954. Professor Bowen, in collaboration with French professors of geography, proposes to use Rennes as the centre for the study of archaeology and geography in Brittany. Details of this School will be announced later this year, but we should meantime be glad to receive at headquarters the names of members who may wish to participate in the course.

Vacation Closing of Headquarters

Members wishing to visit headquarters office or library during vacations are advised to consult the office beforehand to confirm on which dates adjacent to Bank Holidays the building will be closed. The library service will not otherwise be suspended for any period during the summer vacation.

National Information Scheme for Visual Aids

We have been informed of a new scheme announced by the National Committee for Visual Aids in Education and the Educational Foundation for Visual Aids, the aim of which is to bring direct to schools and teachers up-to-date information on visual aids speedily and with a saving in subscription. On payment of a new inclusive subscription of 17s. 6d., subscribers (individual members or schools) will receive all the publications of these two national bodies ; these include a complete set of E.F.V.A. catalogues of films and filmstrips and current pamphlets, monthly issues of the N.C.V.A.E. magazine *Visual Education* and catalogue supplements, pamphlets and information sheets as they are published. This subscription represents a considerable saving from the cost of such material purchased separately, and ensures the automatic delivery of the publications without further application. Full details and subscription forms for the VENISS (Visual Education National Information Service for Schools) scheme may be obtained from N.C.V.A.E., 33, Queen Anne Street, London, W.1.

Scholarships in Geography at Cambridge

Clare, Downing, Jesus and Trinity Colleges are, for the first time, offering awards in Geography in the December, 1954, Scholarship Examination. There will be one paper in Physical Geography and two in Human Geography. Candidates will also be required to take one of the following three alternatives :

(*a*) *either* Biology *or* Geology (in each case including the practical examination) as set to candidates in Natural Sciences ;
(*b*) a paper in Pure Mathematics and a paper in Applied Mathematics ;
(*c*) two papers chosen from among papers 2 (General Historical questions, including Economic History), 3 (English History) and 6 (European History after 1492 and American History) set to candidates in History.

There will be the usual English Essay, the paper on General Questions, and the Translation paper giving two passages in each of a number of modern and ancient languages in which candidates must show a moderate proficiency in one language or some lesser knowledge of two languages.

Girton, Newnham, St. Catharine's and Selwyn Colleges have for many years offered Scholarships in Geography in their February-March Examination and St. John's College has more recently offered such awards in its December Examination. It is therefore possible, provided candidates of sufficient merit present themselves, for about 15 awards in geography to be made at Cambridge each year. Applications should be made to the Senior Tutor of the college of the candidate's preference.

REVIEWS OF BOOKS

WITH very rare exceptions, books reviewed in this journal may be borrowed from the Library by full members or student library members of the Association.

Ordnance Survey One-inch Map of Great Britain, Seventh Series. National Grid, 1952. Paper folded 4/– per sheet. (First sheets issued under review) Sheets 100, Liverpool; 107, Aberystwyth; 108, Denbigh; 109, Chester; 129, Ludlow; 138, Fishguard; 139, Cardigan; 140, Llandovery; 141, Brecon; 142, Hereford; 151, Pembroke; 152, Carmarthen and Tenby; 153, Swansea; 154, Cardiff.

The maps are said to be fully revised. The date of the revision of each map is given and also the date of publication. This revision does not mean re-survey but it does mean revision on the ground. Sundry features have been added—airports, airfields, wireless airmasts, telephone kiosks, bus and coach stations, glass houses, disused windmills, battle sites, intersection points of latitude and longitude, the sites of various antiquities. County boundaries are not now shown. National Trust properties are marked in red, as are youth hostels. In the 6th edition rivers and lakes were shown in blue; in the 7th edition marshes also are shown in blue and the names of all three are printed in blue and so these features are more easily traced. The current Ministry of Transport classifications of roads is shown. The gauges of all main roads have been considerably reduced and the roads are less strongly coloured. All names have been rewritten in a clearer type and so placed as to be easily read. The increase in legibility is striking. Built up areas are shown in grey instead of black with great increase of clarity and improvement in appearance. It is thus possible to show churches, hospitals and schools in black on the grey and so to show them more completely as well as more clearly. Liverpool is an admirable example. Contours are drawn through these built up areas, but gallant as is the attempt, it seems impossible to make them legible. In more open country the relief is admirably shown. The strength of colouring of the roads, rivers and woods has been reduced with advantage. This can be seen, for example, in the representation of the Rheidol Valley in the Aberystwyth sheet. The colouring of the woods is less intense but the names and the contours can be read with much less effort.

One of our members, commenting on the Ludlow map, finds this reduction of contrast and of colour unpleasing and, in such sheets as this, where the contrast of natural features as compared, say, with the Aberystwyth sheet is naturally less, there is a lessening of contrast which may not be pleasing at first sight, but closer examination of the various sheets brings out the remarkable increase on the whole of clarity and legibility. Our correspondent also finds the grid over-prominent. These grid lines are now printed in grey not black. If they appear more obstrusive, it is because the strength of the colouring of the map as a whole has been reduced. It could be claimed that the value of the grid outweighs any obstrusiveness of these lines.

For this 7th edition, the new ingenious folding is adopted whereby any portion of the map may be examined without unfolding the whole. A comparison of the two editions of the Aberystwyth sheet makes it clear that the claim for thorough revision is justified; even though the college buildings, especially the new ones, do not appear to be well shown, there is an outstanding increase in legibility and clarity.

T.C.W.

Studies on British Beechwoods. Forestry Commission, Bulletin No. 20. 18 × 24 cm. 100 pp. London: H.M.S.O. 1953. 12/6d.

The Beech and British beechwoods have been systematically considered in this interesting and comprehensive survey. The text is augmented by an inset containing many fine photographs and by an appendix giving details of the woods studied. There is also a bibliography. The origin and early history of the beech in Britain and its Eurasian range are noted. Ecological relationships of beechwoods in a wide range of soil and locality are then discussed at some length. Forestry practice forms, as is to be expected, an important part of the study.

Possible influences of beech growth on soil character are also reviewed. An estimate of the future use and value of beech in British forestry is given. The map showing the distribution of sites studied gives an impression of incomplete coverage. Examples from northwest Britain and the industrial Pennines might well have been included. R.C.

Welsh County Details, Census of Woodlands 1947-49. Woods of Five Acres and Over. Forestry Commission. Census Report No. 3. 20 × 32 cm. 90 pp. London: H.M.S.O. 1953. 4/–.

A Supplement to Census Report No. 1, Report No. 3 consists wholly of tabulated statistics. The introduction explains that their significance has been discussed in the first report. For easy comparison, corresponding figures for Great Britain, Wales and Monmouth and each Welsh county are presented in a series of nine tables. These classify the woodlands mainly under the headings of type, e.g. high forest, scrub, age and species. Each county thus has its woodland closely analysed. A break-down into divisions smaller than counties is understandably absent but would have been useful. R.C.

West Durham: a problem area in North Eastern England. G. H. J. Daysh and J. S. Symonds. 16 × 25·5 cm. x + 431 pp. Oxford: Basil Blackwell, Ltd., 1953. 45/–.

This book deals with County Durham west of the Great North Road, a problem area because it is so largely dependent for the support of its 300,000 inhabitants upon a rapidly wasting asset, the famous coking coal which has now been intensively exploited for at least a century. There are rather more than 100,000 workers in the area at present and, of these, more than 40 per cent. are employed at collieries, the only other form of production which employs a significantly large number being the steel industry at Consett.

Dependence upon coal-mining is not so great now as before the great depression of the pre-war decade, which was responsible for wholesale unemployment. Many of the pits in the south-west became flooded while idle and have not survived. Owing to its specially desperate plight, the south-west was given priority in respect of immediate assistance and some new light industries were introduced there. But, apart from the large steel works at Consett and some travel to work on Tyneside and in the Team Valley Trading Estate, the dependence of north-west Durham upon coal-mining remains absolute. This old mining district, however, is now approaching exhaustion. The reserves that remain are in thin seams and the water problem in the pits is acute. In spite of extensive plans for capital investment, the National Coal Board expects that by 1965, coal production will have dropped by 18 per cent. and employment by as much as 30 per cent. The problem of policy, which is here examined in detail, is whether and to what extent it is right and practicable to bring new work to the workers established in this area as an alternative to migration. The suitability of north-west Durham for the introduction of new industries is examined in the light of the experience of the few firms that have settled there since the war. These are only seven in number, employing about seven hundred workers (nearly all girls) in 1950. The well-known difficulties and social effects of migration are re-iterated and migration is clearly regarded as only a last resort.

Whether or not one agrees with this appraisal of the needs of the situation and what is in effect a moderately stated but all the more cogently argued defence and advocacy of Development Area Policy, one must recognise the value of this timely statement of the approaching problem that faces the area. At present, West Durham is almost free from unemployment, and redundancy of labour, although quite inevitable, should not make itself felt seriously for another ten or fifteen years. It is earnestly to be hoped that instead of being driven to makeshift expedients and palliative measures to relieve clamant distress then, the problem will be met by a carefully formulated policy applied in good time.

In thus focussing attention upon West Durham as a problem area, the authors have presented much descriptive and statistical material of great value to the student of geography. One of the authors is himself a Professor of Geography, and the analysis is clearly presented against the background of the area's physique and in the context of its economic geography and settlement pattern, and is well supported by appropriate map illustrations. Of special interest is a map which shows, along with the dependent settlements, the distribution of ninety major collieries in West Durham, classified according to their expectation of life. There is also an especially valuable summary of the settlement characteristics of the area, accompanied by a map on which settlements are classified according to functional type. That Bishop Auckland should appear on this map as an agricultural settlement, however, is, to say the least, misleading. A.E.S.

The Channel Shore. (The Regional Series). A. de Selincourt. 14 × 22·25 cm. x + 229 pp. London. Robert Hale & Co., Ltd. 1953. 18/–.

I enjoyed reading this book. It is not, of course, a technical book in any sense of the word. It is not particularly geographical even in the widest interpretation. Nevertheless, it does give an interesting account of the south coast ports, and it contains plenty of useful and easily assimilable information. The author is a keen yachtsman and knows the many harbours, large and small, on the Channel. He talks about these in a friendly way, and, like anyone else, he also has his prejudices. It is not difficult to find criticisms—the River Ouse (p. 44) does not flow northwards, and the account on page 1 of the way in which Britain became an island is altogether too cataclysmic. Read the book to get a picture of the present as well as of the past of our South Coast havens, and you will find that the enjoyment you will obtain will encourage you, if you are so inclined, to find out more for yourself. The illustrations are good, and the map useful. J.A.S.

The Southern Marches. The Regional Books Series. H. J. Massingham. 14·5 × 22 cm. xv + 368 pp. London: Robert Hale, Ltd., 1952. 21/–.

The author has approached this portion of the British Isles which is neither England nor Wales in the only manner acceptable to the geographer, that is, from the ground. The pages are packed with information concerning not only the topography, but also the architecture, geology and ecology, folklore and history and the craftsmanship both past and present of the region. In fact, the *character* of the area is discussed. Here is neither a text-book nor a guide book, and yet it could very well serve as either. If you require detailed knowledge of the geology or climate of the area, then this is not your book, for neither, as such, finds a place in the chapter headings nor in the index and yet both these important features are mentioned in detail somewhere in the pages. Perhaps there is an over-emphasis on the subject of religious architecture in the 25 admirable photographs, for only 3 show the landscape. A simple geological map would have been helpful. Nevertheless, this is an admirable introduction to the area for the stranger which, at the same time, by its inclusion of controversial topics, its exploration of the less frequented ways and its treatment of an intricate theme, is still very readable to those who "know" the area. R.A.Y.

Exeter. B. Little. 14·5 × 22 cm. 168 pp. London: B. T. Batsford, Ltd., 1953. 15/–.

The scope of this book has been widened more than the main title may suggest to include descriptions of Crediton, Cullompton, Exmouth, Ottery St. Mary, Tiverton and Topsham. In the author's words, the book "blends history and economics with architecture . . ." the emphasis being on ecclesiastical and domestic architecture. Apart from the broad attraction of this book, illustrated with numerous excellent photographs, the geographer will be mainly interested in the references both to the woollen industry and trade of East Devon and to the part played by some of the woollen masters in the social development of the area. S.J.J.

The Soils of Europe. W. L. Kubiëna. 17·5 × 24·5 cm. 317 pp. London: Allen and Unwin, Ltd., 1953. 75/–.

Soil studies have suffered from the lack of any systematic by means of which the results of individual researches could be correlated, and this work of Professor Kubiëna, a systematic of European soils, is therefore of great importance. The classification extends down to, but does not embrace, the soil series (where the local factors are most manifest) or, by analogy, includes orders but not genera. There are four simple keys for humus form, South European, North European and Alpine soils, considered separately, and a more complex key for all European soils. The criteria used in framing the alternatives by means of which identification is effected (as in a flora) are colour, horizon development, humus type, reaction and geology. A valuable attempt has been made to standardise the nomenclature by introducing a binary Linnean system, with, however, already existing names drawn from various languages—e.g., rendsina, chernosem, rather than terms newly-created from the classical languages. The book, providing a link between the great soil groups first distinguished by the Russian pedologists, and the clays, loams, etc., of local studies, will prove invaluable at University level. The excellent coloured plates with their teaching potentialities, should also ensure it a place in all school libraries. E.M.Y.

Geographical History in Greek Lands. J. L. Myres. 14·25 × 23 cm. 381 pp. London. Oxford University Press, Ltd. 1953. 35/–.

It is a fine thing for geographers that this collection of addresses and papers by Sir John Myres should become available in a well-made volume. The book begins with his inaugural lecture before the University of Oxford in 1910, when he entered upon the Wykeham professorship of Ancient History. There are included two communications to our own Association, that in 1922 on the geographical distribution of the Greek city-states and that in 1941 on the position of the Greek Kingdom in the eastern Mediterranean.

These studies are of the material of which pure geography is made, and they are phrased to perfection, and phrasing does count so highly in geography. Those who escaped or have forgotten a classical education may lose their way among some of the textual references, but even if they are not disposed to trace such references there is very much of benefit for them to read. There is no other area on earth comparable with Greece, the Aegean islands, and the Mediterranean region generally, where " geographical history " can be viewed with better clarity. The phrase quoted from Sir John Myres's title is explained by him as connoting " a pendant group of studies " (pendant, that is, to historical geography) " which might be better described as geographical history; for sometimes it is the geographical features which invite historical commentary, rather than the historical events which invite geographical." This is a distinction essential to remember.

The present reviewer is grateful for this opportunity of offering the tribute of a pupil to his master. O.J.R.H.

The Balearics. Majorca, Minorca and Ibiza. E. Whelpton. 14·25 × 22 cm. x + 276 pp. London. Robert Hale, Ltd. 1952. 21/–.

Since the beginning of this century the Balearic Islands have become the resort of artists, tourists, and Spanish honeymoon couples. Majorca is the Capri of Spain and Minorca has been known to the British since Admiral Byng in the 18th century failed to relieve the best port in the Mediterranean. In Ibiza they still take to the woods at the approach of the tax-collector.

These islands, where Arab influence shows in the brilliant white of the buildings, welcome the holiday-maker with dignity. " In Moslem lands the supernatural vanishes before the materialism of an essentially practical religion, and so in the Balearics there is no evil magic in the air. Even the scenery is free from any malignant influence." The author, in non-technical language, describes the islands and their history and gives advice to intending visitors from personal experience. The photographic illustrations, with their deep shadows, better the impression he gives of dazzling sunshine and contrasted shade. L.R.L.

Spain and Portugal. The World in Colour Series. Ed. Dore Ogrizek. 14·5 × 19·5 cm. 480 pp. London: McGraw-Hill Publishing Co., Ltd., 1953. 30/–.

E. Beuville's water colours of landscapes and A. Brenet's of cities and cathedrals evoke the Iberian scene with remarkable power. They are splashed across the matt pages with decorative effect (e.g., pp. 142–3 and 174–5). For such pictures a use of the simple device of " framing " through index and thumb, to restore colour-relation and the third dimension, is well repaid. The brightly translated text, mainly by Suzanne Chantel, is often deftly descriptive, though would-be epigrams may irritate. Perhaps the author's naïve acceptance of poverty and riches and of secular dominance by church and military is now part of the contemporary scene. A bright tourists' book, for the more intelligent tourist. A.G.

French Life and Landscape Vol. II. Southern France. A. Firth. 14 × 22·25 cm. 149 pp. London: Elek Books, Ltd. 1953. 18/–.

Following a suggestive introduction, in which a prospective holiday traveller's questions are stimulated and simply answered there are nine regional chapters. These describe Burgundy and Franche-Comté, the Rhone valley, the Côte d'Azur and Haute Provence, the French Alps, Languedoc, Auvergne and the Massif Central, "From Poitou to the Pyrenees," the Pyrenees and Corsica. In each chapter a short portrayal of the region as a whole is followed up by a series of portrait sketches of places in readily decipherable order. Impartial assessment of present and past is pleasantly balanced by frankly personal predilection. Objective description or summarisation is supplemented by thoughtful generalisation. Thus the book makes good fireside reading whether to stimulate travel or refresh memory and might well be taken as a guide book on an actual journey.

There are 53 good photographs of scenery, monuments and people, an end paper map and an index of places. A.G.

Greenland. 14·5 × 22 cm. 167 pp. Ringkjobing: Royal Danish Ministry for Foreign Affairs.

Though this is, in a sense, an official publication of the Danish Ministry of Foreign Affairs, it is a broadly humane compilation written for the general reader rather than for the sociological specialist. Mountain, sea and ice form the introduction to a story of Eskimo life. It is a pity the name Innuit has not come into use. The ice is receding but the great ice-cap is still a formidable feature. Summer flowers in the lowlands are variegated with coloured cushions of moss, and caribou and white and blue foxes are found but have been too much hunted. There are still communities in which the head of the household gets by his own hunting all that his women and children need for food, clothing and general equipment. But, in general, what we call civilisation has changed modes of life and the interiors of the homes. Walrus has become scarce in many parts but seals and fish still abound. A few Greenlanders have taken to whale-hunting. The old stone-and-turf huts linger only in Thule and a few other spots. The Igloo has almost disappeared. The women's boat or umiak, perhaps related to the Irish skin-boat or Curragh, is rare, and the kayak is replaced for hunting by the motor-boat. The Danish rule has been paternal and kindly and one should always remember that the Eskimo are not mere savages like some other peoples who live by hunting; they are a highly specialised group with remarkable special skills valuable in their difficult environment. H.J.F.

Blind White Fish in Persia. A. Smith. 14 × 22·25 cm. 231 pp. London. Allen and Unwin, Ltd. 1953. 16/–.

In the summer of 1951 four Oxford undergraduates visited the Kirman district of Persia, travelling in their own 15-cwt. lorry first to Genoa and thence by boat and lorry via Beirut. *Blind White Fish* is the story of these three months told by the biologist of the party. This last fact, with the title, might suggest that the book deals with a relatively limited field of natural history, but such is not the case. Instead there is a detailed description of human life and general conditions in a number of villages round Kirman. Mr. Smith is a most acute observer, and his account of the Persian scene is accurate and balanced, though at times his powers of expression do not always measure up to his discernment and sympathy with his subject, and occasionally lack of previous knowledge of the country becomes a difficulty. For the general reader there is the charm of an adventurous tale, briskly told, and for the geographer suggestions of deeper questions over which to ponder. W.B.F.

Portrait of Tangier. Rom Landau. 15·5 × 23·5 cm. xviii + 246 pp. London: Robert Hale, Ltd. 1952. 21/–.

This book, written by a well-known pro-nationalist authority on Moroccan affairs, is the outcome of a frustration. Forbidden to enter the Spanish Zone of Morocco, he turns his attention to a survey of Tangier. The author is, however, to be congratulated on the generally impartial description and just assessment he makes, although his views of French colonialism are not masked. The book is almost wholly occupied with the city rather than the International Zone in its entirety, although its administration is described generally. It is divided into six parts, dealing respectively with the history, administration and appearance of the city, its legal and illicit traders, the foreign communities and their services and the Moors.

The task of such an enterprise is great, for Tangier is sphinx-like and it is difficult to drag the secrets out of such a melée of nationalities, politics, customs and outlooks. But on the whole the author accomplishes this successfully and his book is lively in descriptive detail. The account of the old town is particularly colourful and vivid. It is a pity that there is no plan of the city reproduced, especially as the better known streets are constantly referred to in the text. The statistical material is somewhat inadequate and an appendix on the population composition of this cosmopolitan city would be highly desirable. The survey taken in 1948 might form the basis for this. The book is also lacking in any adequate outline of the trade and commerce of this important North African port, especially as much is made of the historical role of its harbour in the early part of the text.

There is a useful bibliography and the book is well illustrated with 38 excellent photographs. The work is a useful guide to the labyrinthine features of this intriguing city. J.M.H.

The History of Nigeria. Sir A. Burns. Fourth edition. 14 × 22·25 cm. 332 pp. London : Allen and Unwin, Ltd., 1951. 25/–.

This well known book, the first history of all Nigeria, was originally published in 1929. Four chapters deal with the various ethnic groups and pre-European history. Then follows the main body of the book, concerning Nigeria since the days of the unrestricted slave trade. The last eight chapters describe the organisation of the country around the time of the last World War.

But a great deal has happened since the last edition was prepared in 1947. The 1946 Constitution was replaced by another in 1952, which in turn is now being radically modified. This alone makes a new edition urgent and Sir Alan Burns might then also recast such statements as " sandbanks are held together by the roots of the mangrove trees " (p. 16) ; " there is no doubt that the desert is gradually encroaching " (p. 18) ; " the land is fertile " (p. 276) ; " the loud-mouthed demagogue who preaches self-government and independence would be silent if he thought that there was the slightest chance of these things becoming facts " (p. 279) ; " Nigeria is not yet fitted for self-government, and it will be many years before the people are sufficiently united and sufficiently educated, and their leaders sufficiently public-spirited, to assume the responsibilities of self-government " (p. 283). Most of the maps should also be re-drawn as they are unworthy of such an author.

Nevertheless these few imperfections are mostly in chapters marginal to the main historical survey, which will long remain the main source. R.J.H.C.

A Text-book of West African Agriculture, Soils and Crops. F. R. Irvine. Second edition. 12·5 × 19 cm. x + 367 pp. + xxxii plates. London : Oxford University Press, Ltd., 1953. 14/–.

This " reference work for teachers " is one of several pioneer texts from Dr. Irvine's ten years experience of West Africa in teaching at Achimota School. One quarter is devoted to Soils and Manures, two thirds to descriptions of crops, the rest to techniques of plant propagation, pest control and hints on school gardening. Trends in the agriculture of British West Africa since the first edition in 1934 are covered in a short addendum. The new emphases are exemplified by the headings " Soil Science," " Soil Conservation," " Swollen Shoot," and in the up-to-date bibliography. The description of European methods of agriculture as they might be applied there and the appraisal of African methods are a stimulating, just, and happy combination. Teachers in Britain will find the chapters on sorghums, millets, cassavas and yams a safe guide to their varieties, cultivation, storage and uses. Indeed, the purposeful emphasis on native food crops is a refreshingly down-to-earth supplement to the more orthodox economic treatment of tropical agriculture ; although livestock, other than as providers of manure and for draught purposes, could not be included. The few disappointing paragraphs are in the necessarily compressed introduction to soil formation and composition, e.g., on p. 9 one would certainly be mislead in believing that the reason for the residual hill top position of bauxite deposits in the Gold Coast is due to the heavier rainfall in those positions. These however, hardly mar the main purpose, admirably fulfilled, which is to write as a practical farmer interested in the improvement and maintenance of crop standards and soil fertility in a tropical region. R.W.C.

The Growth of a Nation: the story of the Sudan. H.M.S.O. 17·7 × 23 cm. 29 pp. London: H.M.S.O., 1953. 2/–.

Many teachers will already be familiar with the delightfully illustrated and informative booklets issued and prepared for the Foreign Office by the Central Office of Information and published by the Stationery Office. Frequently these booklets are more widely distributed abroad than they are in this country and they play an important part in spreading accurate information about those countries where so much work has been done by British officials and civilians alike in modern development along all lines. This brochure on the Sudan is an excellent example of its kind. L.D.S.

The Natal Regional Survey. Vol. II. The Population of Natal. M. H. Alsop. 14 × 22 cm. vi + 144 pp. London: Geoffrey Cumberlege, Oxford University Press, Ltd., on behalf of The University of Natal. 1952. 30/–.

The first volume of this series was devoted to a survey of the natural resources of the province. The second is a description and demographic analysis of its human resources. Miss Alsop has not attempted to map population in the field, but has, rather, confined herself to extracting all the relevant material for Natal from the censuses of the Union Government. An immediate disadvantage of this process is that the smallest unit which can be mapped is the Magisterial District, which, administrative in purpose, is too large and cumbersome and rarely bears any relation to natural features. Geographers therefore, will derive little information about detailed settlement patterns in this densely populated province.

Within these limits, however, Miss Alsop has presented a clear and reliable picture of current distributions and occupations of all four "racial" elements of the Natal community—Whites, Africans, Indians and Coloureds. She provides a valuable background of facts for those who interest themselves in the problems of race relations. The text is copiously illustrated with maps and diagrams, carefully drawn and flawlessly reproduced. Miss Alsop is to be congratulated on a pioneer effort. D.L.N.

American Beginnings: Highlights and Sidelights of the Birth of the New World. J. M. Morse. 15·5 × 23·5 cm. ix + 260 pp. London. Public Affairs Press, Ltd. 1952. $3·75.

In a "personally conducted tour" of the more important writings about pre-revolutionary British America the author has attempted by commentary and brief quotation to give something of the flavour of the source material of early American history. The work remains, nevertheless, primarily a bibliography, a useful book of reference for the specialist.

The general reader will find the presentation too fragmentary and inconsequential to hold his interest. History is clearly something more than a matter of "highlights and sidelights." For some rather obscure reason the work fails even to deepen our sense of local colour. Must we conclude that the practical Englishman has always been relatively inarticulate? Certainly the reader will find here little to assist him in grasping the key problems of colonisation or in building up a coherent picture of the slow and intricate stages by which the scattered colonies along the American seaboard were forged into a new nation. P.R.C.

Australia, her story. K. Tennant. 13·5 × 20·25 cm. viii + 296 pp. London: MacMillan and Co. Ltd. 1953. 15/–.

Miss Tennant does not give a formal account of Australian history but takes a series of topics and personalities in roughly chronological sequence. The skilfully-written chapters include vivid accounts of governors, explorers, aboriginals and squatters as well as of gold rushes, federal politics and other matters. It has always seemed remarkable that a modern civilised country could have been built on the foundations of brutality, graft, rapacity and rum which seem to have been so well laid in the early decades of the New South Wales Colony. Miss Tennant makes this a grim story, but also brings out the rise of more human and democratic forces that have helped to shape the modern Australia. She is clearly a proud Australian, but looks realistically at her country to-day. Those with some aquaintance with Australia's development will get most out of this book, but it will be found vastly interesting and informative by all readers. L.S.S.

Papuans and Pygmies. A. A. Vogel. 14 × 22·25 cm. 159 pp. London: Arthur Barker Ltd. 1953. 16/–.

Mr. Vogel is a retired Swedish cavalry officer who in 1950 took part in an expedition to the interior of New Guinea. He went as the guest of Sir Edward Hallstrom, an Australian millionaire who has set up an experimental farm in the Wahgi Valley. This is an enlightened attempt to improve the life of a people who have so far been protected from the more harmful effects of contact with the outer world. The author travelled with Captain Blood and his family to the pygmy country of the Bismarck Range. In these remote parts every excursion is almost sure to find something new, and here the discovery of a workshop of the famous Hagen axes is of first importance. For the rest, Mr. Vogel's colourful descriptions of caging cassowaries, primitive pig-keeping, pygmy peace-making, and other customs, provide ample material for at least one lively geography lesson.

W.C.B.

Social Anthropology in Melanesia. A. P. Elkin. 14 × 22 cm. xiii + 166 pp. London: Geoffrey Cumberlege, Oxford University Press, Ltd., 1953. 27/6.

This is an excellent and authoritative survey of research in the social anthropology of Melanesia. It was prepared by Professor Elkin of the University of Sydney at the request of the South Pacific Commission. It should prove of particular value to administrators, technicians and others taking up residence in Melanesia. It is an essential volume for anyone contemplating research in social anthropology or human geography in Melanesia. It is of less direct value to teachers of geography in schools within the confines of the United Kingdom, although all geographers interested in the social customs of the many peoples of the South Pacific will find the comprehensive references at the end of each chapter invaluable.

The book is divided into three parts: (i) Types of Ethnographical record and research up to 1950; (ii) A Survey of Anthropological knowledge of the region with suggestions for research projects (on a territorial basis); (iii) Principles of a plan of anthropological research in Melanesia, related to native welfare and development.

E.M.J.C.

Social Anthropology in Polynesia. F. M. Keesing. 14 × 22 cm. x + 126 pp. London: Geoffrey Cumberlege: Oxford University Press, Ltd., 1953. 27/6.

This is a companion volume to *Social Anthropology in Melanesia.* It presents a summary of work done in the field of Polynesian social anthropology, particularly as relevant to the programme and purposes of the South Pacific Commission. The author also estimates further research needs and priorities. The term "Polynesia" in this volume includes not only the well-known Polynesian "triangle" of the central and eastern Pacific but also Fiji as well as certain adjacent areas of Micronesia which fall within the Commission's purview; it excludes three important groups of Polynesians (the Hawaiians, the people of Easter Island and the Maoris of New Zealand) who live in territories outside the declared scope of the South Pacific Commission.

Separate chapters are concerned respectively with economic development, social development, health and research needs and possibilities. Again, for the teacher of geography, the most valuable section of the book is the comprehensive bibliography which includes works in French and German as well as in English; a system of asterisks has been adopted to give a general sense of the importance of each work in relation to the Commission's interest in social anthropology, as well as the professional competence of the work involved.

E.M.J.C.

Seventh Continent. Saga of Australasian exploration in Antarctica, 1895–1950. A. Scholes. 14·5 × 22 cm. 226 pp. London: Allen and Unwin, Ltd., 1953. 21/–.

This is a useful résumé of Antarctic exploration with emphasis on the work of Australasians. To English readers it discloses the great stature of Sir Douglas Mawson, who has done more than any other man in this field. It records also that the *Penola* expedition under John Rymill with its amateur crew produced results out of all proportion to its size and resources. For contrast there is the

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highly professional U.S. Navy Task Force of 1946 with many ships and thousands of men.

The moral is plain, that the ideal is between these two extremes and that exploration will not be complete until someone goes right across the continent on foot. A good book for the school library, though the maps are disappointing.
F.D.

The Concise Oxford Atlas. Eds. D. P. Bickmore and K. F. Cook. 19·25 × 26 cm. viii + 97 pp. of maps + clxviii pp. gazetteer. Oxford: Geoffrey Cumberlege, Oxford University Press, Ltd., 1952. 18/6.

This atlas has been based on work prepared in connection with the Oxford Atlas, but it is by no means an abridged edition of the larger volume. It contains many new maps including one of Great Britain showing types of inland and coastal scenery and another of the same area entitled " Sun and Rain."

Generally, the atlas will prove of greater value to teachers of geography interested in the technique of map production and in cartographical characteristics than to those desiring a reference atlas. The majority of maps are coloured politically. An attempt has been made to relate the colouring to contemporary political groups. Each country has its own colour combination related to a basic colour of the political " bloc " to which it has been assigned by the editors of the atlas, viz., Commonwealth Countries, United States, Western Europe, Moslem Bloc, Communist, Latin America, Others, as at June, 1952.

The general arrangement and the spelling in some instances would seem to suggest that the atlas is an English edition of a work originally intended for sale in the United States of America. It would seem essentially a desk atlas for the busy American business man. The group of new maps on Great Britain would seem to be an English substitute for special maps of the U.S.A.

There is an interesting gazetteer which unfortunately gives grid references instead of geographical co-ordinates. There is a small panel of information about each country; in each case this includes some historical data but the grounds for including certain events are not always clear, e.g., " 1147 Foundation of Moscow " under the U.S.S.R. and " 1502 visited by Christopher Columbus " under Columbia. Some territories have no historical events thought worthy of mention. The gazetteer is not without interest and it gives many interesting facts. There is also an historical gazetteer of Great Britain and Northern Ireland giving an annotated list of " major historic sites " depicted on two maps of historical sites, " before " and " after " 1086.
E.M.J.C.

The Columbus Atlas. J. Bartholomew. 21·5 × 28·5 cm. viii + 160 pp. + 137 pp. general index. Edinburgh: John Bartholomew and Son, Ltd., 1953. 45/–.

This is an excellent reference atlas and should be on the bookshelves of every teacher. It is, however, designed for the man of affairs rather than for the geographer. Certain features suggest that it was designed primarily for sale in the United States of America and Canada. It opens with a " strategic map " of North America showing the position of that continent in relation to Eurasia and South America; this map shows also air bases and industrial areas. There follow plans of certain American and Canadian cities.

The maps are of the general high standard that geographers associate with the name of John Batholomew. Most of the maps of Europe, including those of the British Isles, are on a scale of 1 : 2,000,000. The rest of the world is portrayed mainly on the scale of 1 : 10,000,000. Two minor points of criticism. It would seem that a very old plate had formed the basis of the maps of Australia, for the coastlines " bristle," with the names of practically every bay, cape and island. The changing local importance of certain towns in distant parts of the world has not always been noted. The present reviewer has noted a number of examples on the maps of Australia and New Zealand; for example, Kaitaia, an important regional centre, is omitted from the map of New Zealand in favour of the smaller and formerly more important township of Mangonui.

It is to be regretted that the general index gives only grid references and omits to state geographical co-ordinates. This practice, which seems to have become almost universal in recent years, is deplored by the present reviewer who frequently requires to look up the exact latitude and longitude of a place.
E.M.J.C.

The Complete Guide to Map Reading. S. White. 12 × 19 cm. vi + 160 pp. London : Gale and Polden, Ltd. 1953. 12/6.

This work confines itself to the essentials of map reading, which are treated fully and competently although in a manner not particularly inspired. A good feature is the inclusion of tests, with answers. The book has clearly been written in answer to the needs of military map-readers, who will benefit from the author's care to include all necessary points. The compass card illustrated in Fig. 31 is more suited to naval use, while the book as a whole could be improved by bringing up-to-date the examples used in questions and problems. The book is admittedly issued as a reprint. The inclusion of a glossary is praiseworthy, although this one is too short, and geographers will quarrel with the definition of *saddle* on p. 137.

G.H.D.

Introduction to Geology. E. B. Branson and W. A. Tarr. Revised by C. C. Branson and W. D. Keller. Third edition. 15·5 × 23·25 cm. viii + 492 pp. London : McGraw-Hill Publishing Co., Ltd., 1952. 44/–

This is the third edition of an American class text-book first published in 1935. It is divided into two parts : Physical Geology (320 pages) and Historical Geology (150 pages). The latter part is exclusively North American, but British students can read with benefit the clear and admirably illustrated accounts of the life of each period, the emphasis being on the vertebrates.

The Physical section commences with a brief account of the forms of matter that make up the Earth. Volcanism and Igneous Rocks are then treated at considerable length, the emphasis being on their topographical expression and it is rather surprising to find no mention of syenite, dolerite or any ultrabasic rocks. The breakdown of Igneous Rocks by Weathering is then treated in considerable detail and the stage is set for the Physical Agents. First Running Water on fairly conventional lines and then a long chapter on Ground Water, one of the best in the book. After a rather brief chapter on the Ocean, the commoner types of sedimentary rocks are dealt with, to be followed by Metamorphic Rocks. Then, surprisingly, Snow and Ice and the Wind are considered before Structure and Diastrophism and finally a descriptive account of Earthquakes.

The level of treatment of this Physical Section roughly corresponds to that of the average First Year course in an English University. But students can scarcely be advised to invest in this book. Firstly on account of price and secondly because certain aspects of Geology—Mineralogy, Igneous Petrology, descriptive Palaeontology and, inevitably, British Stratigraphy receive such scant treatment. On the other hand it is admirably illustrated and because of this, and for reference to American examples and lines of approach, it might well find a place in a departmental or other library. J.F.K.

Field Geology. F. H. Lahee. Fifth edition. 13 × 19 cm. xxx + 881 pp. London : McGraw-Hill Book Co., Ltd., 1953. 72/6.

This new edition maintains the reputation of 'Lahee' as the standard text book of Field Geology. The general arrangement is unchanged, but a considerable amount of new material has been added to bring the book fully up to date.

After describing with typical American thoroughness and, one must add, an elaborate terminology, the field relations of Sedimentary and Igneous Rocks, folded and fractured strata are considered and then Metamorphic Rocks and Mineral Deposits. Then follows a section on Topographic Form and Topographic Expression, with brief but clear descriptions of landforms, succeeded by a short treatment of cyclical ideas. The middle part of the book is a very complete treatment of the techniques (essentially American) to be used in Geological Surveying (including Topographical Mapping) and the recording of the data obtained. This section includes the use of instruments such as compass-and-clinometer, hand-level, barometer, plane-table, etc. The increasing importance of aerial photograph interpretation is duly recognised. Sub-surface Geology, mainly the interpretation of bore-hole samples is treated next. Then follows a section on the preparation and interpretation of Geological Maps and Reports and finally an excellent chapter on Geophysical Surveying. After a number of useful appendices there is a long bibliography, though the references are almost entirely American. Lahee therefore covers every aspect of geological field work.

The clarity and precision of the text is enhanced by the very large number

(627) of admirably clear illustrations. Whilst certain of the methods advocated may seem over-elaborate to British eyes, ' Lahee ' remains an invaluable reference book to anyone interested in the field aspects of Geology. J.F.K.

The Earth and Its Mysteries. G. W. Tyrrell. 12·5 × 19 cm. xii + 279 pp. London: G. Bell and Co. Ltd. 1953. 16/–.

Dr. Tyrell has a long record of scientific papers to his credit and now he has achieved marked success with a popular volume. As an introduction to geology or geography this volume should take a conspicuous place. It should be found both in universities and in schools. Dr. Tyrrell has covered a wide field as the title of the book suggests: the work of water, wind and fire, the age of the earth and the record of life in the rocks. All these and many other topics are treated and there are useful illustrations and diagrams. Not often do we meet with such a sound scientific work written in so clear a style.

R.N.R.B.

Weather Inference. D. J. Holland. 19 × 25·5 cm. xvi + 195 pp. London. Cambridge University Press, Ltd. 1953. 30/–.

It is adequate testimony to the variability of British weather that just one season, the autumn of 1936, should be sufficient to serve, somewhat in the spirit of a project, for starting points for the introduction and development of the main ideas of synoptic meteorology. The basis of the book is the weather observed from 15th August to 22nd December, 1936, when the author was a schoolboy. As a young professional meteorologist he re-examines these observations and in order to explain the weather sequence he finds it necessary to explain a good deal of general meteorology. Although intended for beginners in the subject this is not a " popular " book and for an understanding of the more advanced topics included, topics normally dealt with in technical treatises, it is necessary to have a greater facility with mathematics than the author seems to suggest is required. The general outlines of the principles of weather analysis, an explanation of the codes used by the Meteorological Office and a survey of major weather types are dealt with in the introductory chapters. Very solid sections give consideration to the elementary thermodynamics and hydrodynamics of the air, and these are likely to be the most difficult chapters for the general reader despite the efforts made to minimise the mathematical content of the arguments. An interesting feature of the book is the series of small scale synoptic charts covering the period 4th to 26th October, 1936; in these, day by day, the weather conditions at one, seven, thirteen and eighteen hours are displayed, and the accompanying explanatory commentaries provide helpful guides to the changing meteorological patterns. The final chapter on practical forecasting is primarily addressed to those concerned with the preparation of forecasts and the work of briefing but it does, incidentally, survey the varieties of difficulties with which the forecaster has to contend and thus helps the general reader to know something of what lies behind the official forecasts. N.P.

Aviation Meteorology of the Route Marseilles-Rome-Athens-Cairo. Met. Report No. 12. M.O. 535g. Air Ministry Met. Office. 15 × 24·5 cm. 68 pp. London: H.M.S.O. 1953. 2/6d.

This description of the weather conditions that occur along the air route from Marseilles to Cairo is the latest addition to a useful series of meteorological reports. It has two main sections. In the first is a summary of the synoptic meteorology of the Mediterranean Basin including an outline of the formation of Alpine lee and other well recognised types of depression and their effects on the weather of the air route. In the second part each of the elements of weather is described in detail for individual sections of the route, and, complementary to this, statistical climatological summaries are appended in tables. N.P.

The Geography of Towns. A. E. Smailes. 12 × 19 cm. 166 pp. London: Hutchinson's University Library, 1953. 8/6.

In the space of no more than 160 pages this text provides a very readable and balanced introduction to the complex field of study concerned with urban geography. The origin and basis of towns—old and modern, the factors of site and setting, the study of towns as expressions of different cultures, the internal structure and morphology of towns and the nature and development of distinctive urban regions are topics effectively discussed and illustrated mainly by references to British examples. Four pages of classified bibliography are added, enabling the advanced reader to follow this interesting and somewhat neglected aspect of geography more deeply. The text should stimulate geographers and should find a place in the school library. A.Gt.

Proceedings of the United Nations Scientific Conference on the Conservation of Resources. 21·5 × 27·5 cm. Vol. 1. Plenary Meetings. lxi + 431 pp. 32/6d. Vol. 2. Mineral Resources. 303 pp. 22/6. Vol. 3. Fuel and Energy Resources. 333 pp. 22/6. Vol. 4. Water Resources. 466 pp. 32/6. Vol. 5. Forest Resources. 325 pp. 22/6. Vol. 6. Land Resources. 629 pp. 45/–. Vol. 7. Wild life and Fish Resources. 259 pp. 17/6. New York: United Nations Dept. of Economic Affairs, 1950–52.

From 17th August to 6th September, 1949, three years after the original proposal had been made by President Truman, the United Nations convened a Scientific Conference on the Conservation and Utilisation of Resources. The meetings were held in the old buildings of the United Nations at Lake Success and a very large number of delegates were present, from the majority of the member-countries of United Nations. The United Kingdom alone on this occasion participated fully—no less than 78 delegates being named—and they were under the leadership of Sir Harold Hartley.

The work of the conference consisted of a number of Plenary Meetings attended by all the delegates, at which papers were presented covering broad aspects of conservation and utilisation. These are all published in full in Volume I of the Proceedings, entitled *Plenary Meetings*, together with the full text of the inauguration ceremonies and the introductory remarks of Chairmen.

Obviously these broad surveys are of special importance, and they include the "World Resources Situation," by Fairfield Osborn; "World Resources and World Population," by Colin G. Clark; and a group of papers on agricultural shortages in Food, Forests, Minerals and Fuel. A third group of Plenary papers deal with the interdependence of resources, with papers by Emmanuel de Martonne; on "European Resources," by Ernst Weissman; and on "The Planning of Land Use for Full Production," by L. Dudley Stamp.

Later Plenary Sessions presented general surveys in the separate fields for the benefit of the delegates as a whole.

The greater part of the detailed work of the Conference was carried out in Sectional meetings. For this purpose delegates split into six groups. The first dealt with Mineral Resources, the second with Fuel and Energy, the third with Water Resources, the fourth with Forest Resources, the fifth with Land Resources, and the sixth with Wild Life and Fish. The Reports of all the papers delivered and the discussions at these Sections form Volume 2 to 7 of the *Proceedings*, and a final volume, volume 8, is devoted to a comprehensive index.

It is obviously quite impossible to give any details of the actual papers. It is sufficient to say that these volumes form a mine of information of the utmost value. It was left to the countries concerned, who in turn delegated, in most cases, the work to their individual delegates as to the ground which was covered and the method of presentation, so that the papers taken as a whole do not necessarily give a comprehensive world view; but they do give an immense amount of information on a very large number of countries.

Some of the papers are illustrated by maps and diagrams and a certain number by photographs. Anyone who is undertaking intensive work on any given country, or on any given topic, or is anxious to prepare a succinct account embodying recent views would do well to seek first what may be published in these large, comprehensive volumes. L.D.S.

Atlas of Mineral Resources of the World. W. Van Royen. 39 × 31 cm. ix + 181 pp. London: Constable and Co., Ltd., 1953. 70/–.

This is the second volume of a comprehensive atlas of the world's resources prepared under the auspices of the Department of Geography in the College of Business and Public Administration of the University of Maryland, where the cause of geography is actively upheld by Professors W. Van Royen and Oliver

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Bowles. It is appropriately dedicated to the memory of the late O. E. Baker, whose *Atlas of the World's Agriculture* marked the birth of a whole series of atlases and cartographical representation of world resources.

The present atlas consists of a considerable text dealing with each of the principal minerals, including also water power, each chapter having tables of salient statistics referring in some cases to world resources, but with an emphasis on the United States' position. According to the mineral concerned, there are world maps and maps of the principal fields. Thus the important chapter on coal has one map of major world fields, another showing world production, maps of American resources and of European and Asiatic resources, together with some specimen maps of such fields as the British East Midland (actually the Yorks., Notts. and Derby) and the Ruhr. Each section has in addition references, so that the whole is much more than just an atlas.

The whole is in black and white, and teachers will find it a most valuable source of information, in most cases with details up to 1949. L.D.S.

They Can't Afford to Wait. A story of U.N.E.S.C.O. Technical Assistance in South-East Asia. 16 × 24 cm. 34 pp. London: Ministry of Education, 1953. n.p.

Amongst the many functions of U.N.E.S.C.O. is to present in popular form, so as to appeal to a very wide range of readers, some account of the varied work in which the organisation is concerned in many parts of the world.

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World Resource Statistics. J. C. Weaver and F. E. Lukermann. 21·5 × 27·5 cm. vi + 166 pp. Minneapolis. Burgess Publishing Co., Ltd. 1953. $4.00.

The aim of this volume in the authors' own words is to provide a " quantitative reality " to the study of economic geography. They recognise that the statistics required are widely disseminated and have set out to bring together a selection of the primary material. Such material must include past as well as present data in order that trends may be discerned. The tables take this into account and data for selected years in the pre-war period are included, although the reasons for the choice are not always so obvious. In each case rather fuller treatment is given to the United States. The notes to some of the tables could well be clarified, e.g. the definition of the " economically active population " (p. 8) is not clear, for the fact that figures are based either on an " industrial " or " occupational " basis does not complete the definition sufficiently.

One must realise, as the authors emphasise, that comparable figures for many areas, *e.g.* China, do not exist, or are not available in detail, so that World totals can be misleading, unless used with due caution.

The need for keeping tables up-to-date and the advantages to be derived from the graphical presentation of data have been catered for by the provision of blank columns, graph paper, blank outline maps and a loose-leaf type binding, all of which underline the inevitable shortcomings of this kind of compendium. This book represents a good model of its kind.

K.R.S.

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The Prophecy of Famine. H. J. Massingham and E. Hyams. 14·5 × 22 cm. 192 pp. London : Thames and Hudson, Ltd., 1953. 12/6.

This is, fundamentally, a tract to plead a cause. The cause is the return to the land and the creation of a cadre of small farmers (rather unsatisfactorily described as peasants) working the soil intensively, and reclaiming marginal under-utilised land, so that the agricultural output of Britain would be greatly increased. The small farmer is advocated partly for social reasons, the benefits of country life and work on the land for the largest possible number, and partly for reasons of maximum yield per acre, which is higher on small family farms than on large estates provided that other things, in the form of capital and skill, are equal. It is argued that a radical increase in output depends on increased working hours and on the return of all waste to the land in order to build up and maintain fertility : in this argument there is much truth, although it does run counter to current social trends. The urgency of the situation in the authors' diagnosis is the decline in the country's export business and the necessity to feed more on the produce of Britain's own soil. The urgency of the situation is, however, over-emphasised : there are exports still. Indeed, the book gives the impression of wishing the decline of the export industries. The object of the tract is self-sufficiency, a self-contained economy with only limited economic contacts with the outside world. It would, in fact, be the only condition under which farming could be protected to the extent envisaged.

In addition to this main theme, there are subsidiary themes. As Edward Hyams is one of the authors, the controversy of 'organic' farming versus 'chemical' farming and of mixed farming versus monoculture is given considerable prominence. Agricultural scientists are denounced in this context just as industrialists are denounced in the context of the main theme. W.S.

World Geography. New edition. J. H. Bradley. 19 × 25·25 cm. vii + 487 pp. London : Ginn and Co., Ltd., 1953. 29/6.

Most American textbooks of world geography seem to follow the same, almost stereotyped, plan. After an introductory chapter in which the meaning of "geography" is explained and the various "kinds" of geography indicated, there follow successive "Units of Study" devoted to man and climate, man and relief, man and natural resources. Illustrative examples are chosen, wherever possible, from the U.S.A. A shorter section on the Regional Geography of the rest of the world concludes the work. The space which is given to any country in this section is small and most of it has a strong political flavour. The new edition of *World Geography* follows closely this general plan. The section or Unit of Study devoted to climate is given the fullest treatment. An appendix covers map projections and other aspects of elementary cartography. Like most of these American books, this one is profusely illustrated with photographs and diagrams of all types. There are, in addition, eleven striking coloured relief maps.

The book is addressed to America's secondary school pupils who are described as being "geographically illiterate." This might explain why some of the text is written in an over-simplified style and also accounts for the inclusion of exercises of the cross-out-what-is-not-true type which follow every chapter. Yet this has not precluded the author from discussing difficult economic and social problems and books which most able sixth formers would find very tough going are recommended for further reading.

So much is attempted that, in spite of the 500 large pages, there is much generalisation, not all of which seems valid. There is scarcely a chapter in which there does not appear a statement which is misleading as it stands. J.A.M.

Geography in School. J. Fairgrieve. Sixth edition. 12·5 × 19 cm. x + 421 pp. London : The University of London Press, Ltd., 1949. 14/–.

This sixth edition appears to be mainly a reprint of the fourth edition, which was reviewed in *Geography* in 1949. That edition contained Mr. Fairgrieve's presidential address which rounded off forty years of teaching. It also took note of changes introduced by the 1944 Education Act and contained an appendix dealing with the film in the classroom. That there is a present demand for this book is witness that it still meets a need. That need is well met. T.C.W.

Amundsen. B. Partridge. 14·25 × 22 cm. xv + 206 pp. London: Robert Hale, Ltd. 1953. 16/–.

This new life of Roald Amundsen, the Norwegian polar explorer, contains little beyond his published work, but the tales of polar travel are worth retelling, especially the South Pole journey. No man has to his credit a wider polar experience and he was wonderfully successful in all he attempted, for he was careful in planning and bold in execution. Perhaps he may be regarded as the last of the pioneer explorers, at least in the North. He was also the first to use air transport.

Perhaps undue space is given to Amundsen's difference of opinion with the Italian aviator, Nobile, with whom he flew across the Arctic Sea from Spitsbergen to Alaska. In trying to rescue Nobile from a later disastrous flight, Amundsen lost his life. The book makes good reading, even if it adds little to Polar records, and has no extravagant passages. The sketch maps are useful. R.N.R.B.

There's Always Adventure. Grace E. Barstow Murphy. 14 × 22 cm. 220 pp. London. Allen & Unwin, Ltd. 1952. 18/–.

Mrs. Murphy accompanied her husband, Dr. Robert Murphy, on many of his travels in South America, Europe and the East in search for specimens for the American Museum of Natural History. Sometimes they took their children with them. The book contains little of the ornithological side of their travels, except as regards the little known and uninhabited Snares Islands, south of New Zealand. It is a light hearted and intimate volume full of the writer's enthusiasm and good humour. It may add little to Dr. Murphy's well known books, but it makes most pleasant reading about many little known parts of the world.

R.N.R.B.

The Study of Local Geography. Charlotte A. Simpson. 16 × 21 cm. 68 pp. London. Methuen & Co., Ltd. 1950. 6/6.

This book is a reprint with minor alterations of one first published and reviewed in this journal in 1934. It is described as " a handbook for teachers " and covers in an elementary and discursive way a variety of topics bearing upon local study work in geography. It will be useful to teachers who have had little previous experience of this kind of work with children. E.P.B.

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